PEPWAVE
Broadband Possibilities

MAX mobile router

User Manual

Pepwave MAX Series:
MAX 600 / 700 / HD2

Pepwave MAX Firmware 5.4
June 2012

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Table of Contents

1 INTRODUCTION AND SCOPE 5
2 GLOSSARY 6
3 PRODUCT FEATURES 7
3.1 Supported Network Features 7
3.2 Other Supported Features 8
4 PEPWAVE MAX MOBILE ROUTER OVERVIEW 9
4.1 MAX 600 9
4.2 MAX 700 11
4.3 MAX HD2 13
5 INSTALLATION 15
5.1 Preparation 15
5.2 Constructing the Network 15
5.3 Configuring the Network Environment 16
5.4 Mounting the Unit 16
6 CONNECTING TO WEB ADMIN INTERFACE 18
7 CONFIGURATION OF LAN INTERFACE(S) 20
7.1 Basic Settings 20
7.2 Wi-Fi AP 24
8 CONFIGURATION OF WAN INTERFACE(S) 26
8.1 Ethernet WAN 27
8.2 Cellular 1 / Cellular 2 36
8.3 Wi-Fi WAN 39
8.4 WAN Health Check 44
8.5 Bandwidth Allowance Monitor 48
9 WI-FI SETTINGS 49
10 BANDWIDTH BONDING SPEEDFUSION™ 52
10.1 SpeedFusion™ 53
10.2 Link Failure Detection 57
10.3 Pepwave MAX Behind NAT Router 58
10.4 SpeedFusion™ Status 59
11 IPSEC VPN 60
11.1 IPsec VPN Settings 60
11.2 IPsec Status 63
12 MANAGEMENT OF OUTBOUND TRAFFIC TO WAN 63
12.1 Outbound Policy 63

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12.2 Custom Rules For Outbound Policy 64
13 PORT FORWARDING 74
13.1 Port Forwarding Service 74
13.2 UPnP / NAT-PMP Settings 76
14 NAT MAPPINGS 77
15 QOS 79
15.1 User Groups 79
15.2 Bandwidth Control 80
15.3 Application 81
16 FIREWALL 83
16.1 Outbound and Inbound Firewall 83
16.2 Intrusion Detection and DoS Prevention 87
17 MISCELLANEOUS SETTINGS 88
17.1 PPTP Server 88
17.2 Service Forwarding 89
17.3 Service Passthrough 91
18 SYSTEM SETTINGS 92
18.1 Admin Security 92
18.2 Firmware Upgrade 96
18.3 Time 96
18.4 Email Notification 97
18.5 Remote Syslog 100
18.6 SNMP 101
18.7 InControl 103
18.8 Configuration 104
18.9 Reboot 105
18.10 Ping Test 106
18.11 Traceroute Test 107
18.12 SpeedFusion™ Test 107
18.13 CLI (Command Line Interface Support) 108
19 STATUS 109
19.1 Device 109
19.2 Active Sessions 111
19.3 Client List 112
19.4 WINS Client 113
19.5 SpeedFusion™ 113
19.6 UPnP / NAT-PMP 114
19.7 Event Log 115
19.8 Bandwidth 116
APPENDIX A. RESTORATION OF FACTORY DEFAULTS 119

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APPENDIX B. DECLARATION 120

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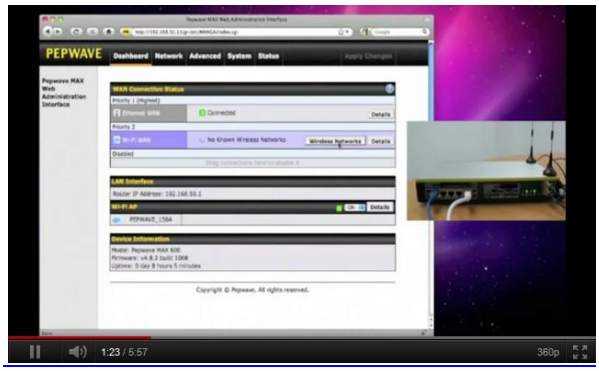
1 Introduction and Scope

The Pepwave MAX Mobile Router provides link aggregation and load balancing across multiple WAN connections, allowing a combination of technologies like 3G HSDPA, EVDO, 4G LTE, Wi-Fi, external WiMAX dongle, and Satellite to be utilized to connect to the Internet.

This manual presents how to set up the Pepwave MAX Mobile Router and provides an introduction to the features and usage of Pepwave MAX Mobile Router.

Tips

Want to know more about Pepwave MAX? Visit our YouTube Channel for a video introduction!



http://youtu.be/UCkVQThLKO4

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2 Glossary

The following terms, acronyms, and abbreviations are frequently used in this manual:

Term	Definition
3G	3rd Generation standards for wireless communications (e.g. HSDPA)
4G	4th Generation standards for wireless communications (e.g. WiMAX, LTE)
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
EVDO	Evolution-Data Optimized
HSDPA	High-Speed Downlink Packet Access
GRE	Generic Routing Encapsulation
HTTP	Hyper-Text Transfer Protocol
ICMP	Internet Control Message Protocol
IP	Internet Protocol
LAN	Local Area Network
MAC Address	Media Access Control Address
MTU	Maximum Transmission Unit
MSS	Maximum Segment Size
NAT	Network Address Translation
PPPoE	Point to Point Protocol over Ethernet
QoS	Quality of Service
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
VPN	Virtual Private Network
VRRP	Virtual Router Redundancy Protocol
WAN	Wide Area Network
WINS	Windows Internet Name Service
WLAN	Wireless Local Area Network

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3 Product Features

Pepwave MAX enables all LAN users to share broadband Internet connections, and provide advanced features to enhance Internet access. The following is the list of supported features on Pepwave MAX Mobile Router:

3.1 Supported Network Features

3.1.1 WAN

- Ethernet WAN Connection in Full/Half Duplex
- Built-in HSPA and EVDO cellular modems **(Available on Pepwave MAX HD2)**
- USB mobile connection(s)
- PC Card WAN connection **(Available on Pepwave MAX 600)**
- ExpressCard WAN connection **(Available on Pepwave MAX 600)**
- Wi-Fi WAN connection
- Network Address Translation (NAT)/ Port Address Translation (PAT)
- Inbound and Outbound NAT mapping
- IPsec NAT-T and PPTP packet passthrough
- MAC address clone and passthrough
- Customizable MTU and MSS values
- WAN connection health check
- Dynamic DNS (Supported service providers: changeip.com, dyndns.org, no-ip.org, tzo.com and DNS-O-Matic)
- Ping, DNS Lookup and HTTP based health check

3.1.2 LAN

- Wi-Fi AP
- Ethernet LAN ports
- DHCP server on LAN
- Static routing rules

3.1.3 VPN

- SpeedFusion™
- VPN load balancing and failover among selected WAN connections
- Bandwidth bonding & failover among selected WAN connections
- IPsec VPN for Network-to-Network connection (Works with Cisco, Juniper only)
- Ability to route Internet traffic to a remote VPN peer
- Optional pre-shared key setting
- SpeedFusion™ Throughput, Ping and Traceroute Test
- PPTP server
- PPTP and IPsec passthrough

3.1.4 Firewall

- Outbound (LAN to WAN) firewall rules
- Inbound (WAN to LAN) firewall rules per WAN connection

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- Intrusion detection and prevention
- Specification of NAT mappings
- Outbound firewall rules can be defined by destination domain name

3.1.5 Outbound Policy

- Link load distribution per TCP/UDP service
- Persistent routing for specified source and/or destination IP addresses per TCP/UDP service
- Traffic Prioritization and DSL optimization
- Prioritize and route traffic to VPN tunnels with Priority and Enforced algorithms

3.1.6 QoS

- Quality of Service for different applications and custom protocols
- User Group classification for different service levels
- Bandwidth usage control and monitoring on group- and user- level
- Application Prioritization for custom protocols and DSL/Cable optimization

3.2 Other Supported Features

- User-friendly web-based administration interface
- HTTP and HTTPS support for Web Admin Interface
- Configurable web administration port and administrator password
- Firmware upgrades, configuration backups, Ping, and Traceroute via Web Admin Interface
- Remote web based configuration (via WAN and LAN interfaces)
- Time server synchronization
- SNMP
- Email notification
- Read-only user for Web Admin
- Authentication and Accounting by RADIUS server for Web Admin
- Built-in WINS Servers
- Syslog
- SIP passthrough
- PPTP packet passthrough
- Event Log
- Active Sessions
- Client List
- WINS Client List
- UPnP / NAT-PMP
- Real-Time, Hourly, Daily and Monthly Bandwidth Usage reports and charts
- IPv6 support **(Available on Pepwave MAX 700 and HD2)**
- Support USB tethering on Android 2.2+ phones

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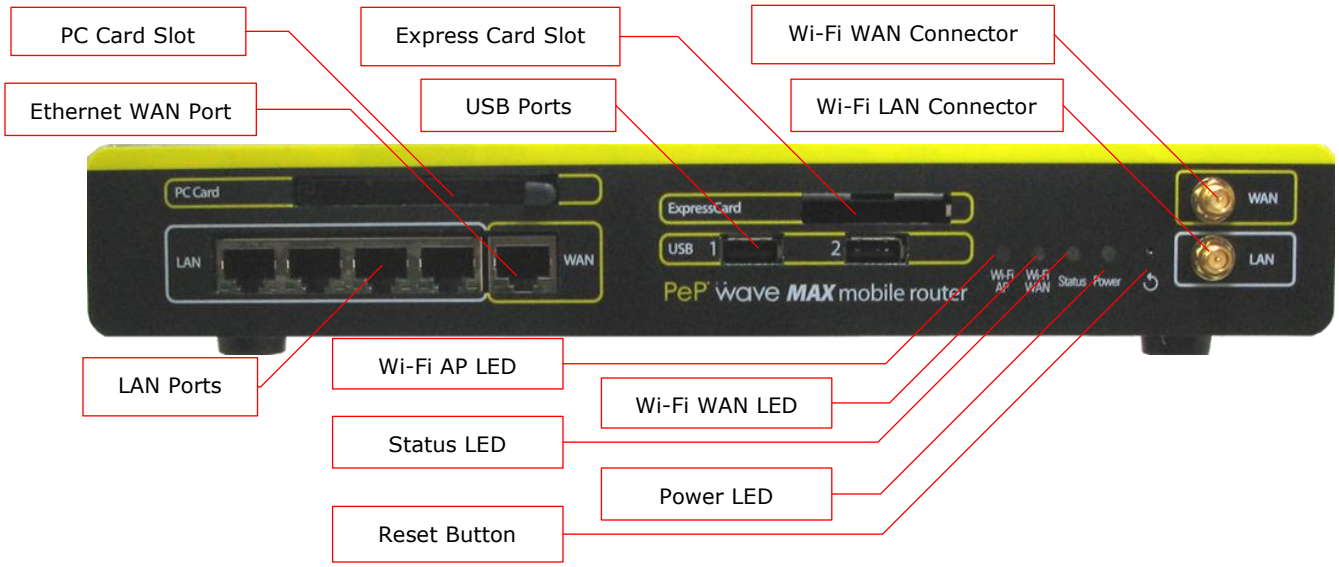
4 Pepwave MAX Mobile Router Overview

4.1 MAX 600

4.1.1 Front Panel Appearance



4.1.2 LED Indicators

The statuses indicated by the Front Panel LEDs are as follows:

Power and Status Indicators		
Power	OFF	Power off
	Green	Power on
Status	OFF	System initializing
	Red	Booting up or busy
	Green	Ready state

Wi-Fi AP and Wi-Fi WAN Indicators		
Wi-Fi WAN	OFF	Disabled Intermittent
	Blinking	Trying to connect but not connected to any wireless network
	ON	Connected to wireless network(s) without traffic
	Continuous Blinking	Transferring data
Wi-Fi AP	OFF	Disabled Intermittent
	Blinking	Enabled but no client connected
	ON	Client(s) connected to wireless network
	Continuous Blinking	Transferring data to wireless network

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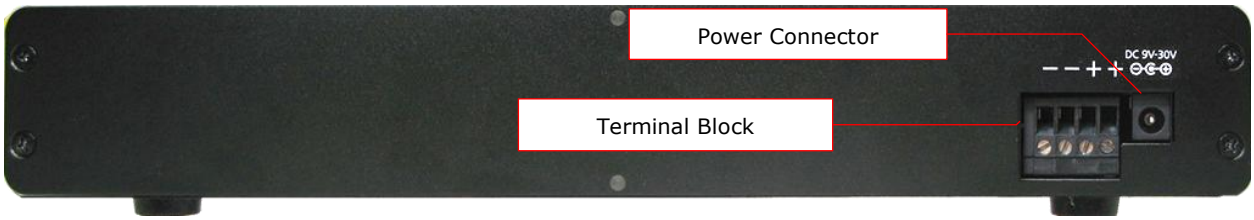
LAN and Ethernet WAN Ports		
Green LED	ON	100 Mbps
	OFF	10 Mbps
Yellow LED	Solid	Port is connected without traffic
	Blinking	Data is transferring
	OFF	Port is not connected
Port Type	Auto MDI/MDI-X ports	

4.1.3 Rear Panel Appearance



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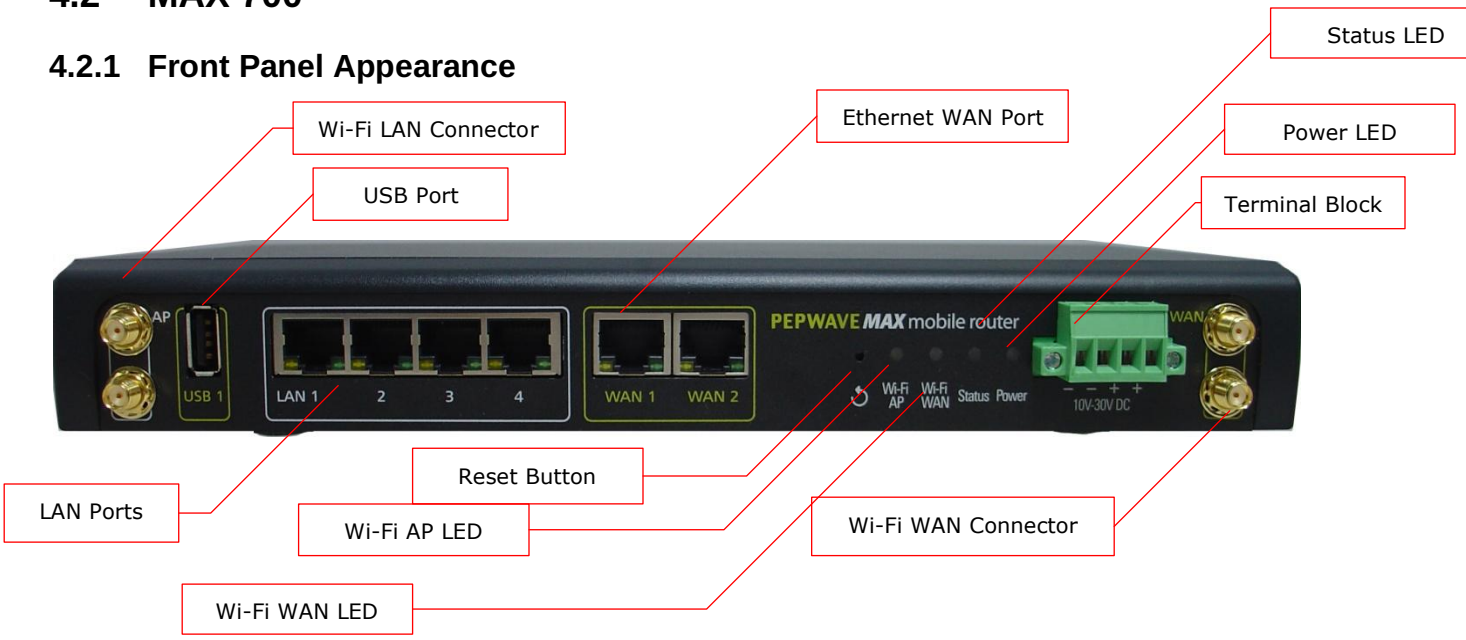
4.2 MAX 700

4.2.1 Front Panel Appearance



4.2.2 LED Indicators

The statuses indicated by the Front Panel LEDs are as follows:

Status Indicators		
Status	OFF	System initializing
	Red	Booting up or busy
	Green	Ready state

Wi-Fi AP and Wi-Fi WAN Indicators		
Wi-Fi WAN	OFF	Disabled Intermittent
	Blinking	Trying to connect but not connected to any wireless network
	ON	Connected to wireless network(s) without traffic
	Continuous Blinking	Transferring data
Wi-Fi AP	OFF	Disabled Intermittent
	Blinking	Enabled but no client connected
	ON	Client(s) connected to wireless network
	Continuous Blinking	Transferring data to wireless network

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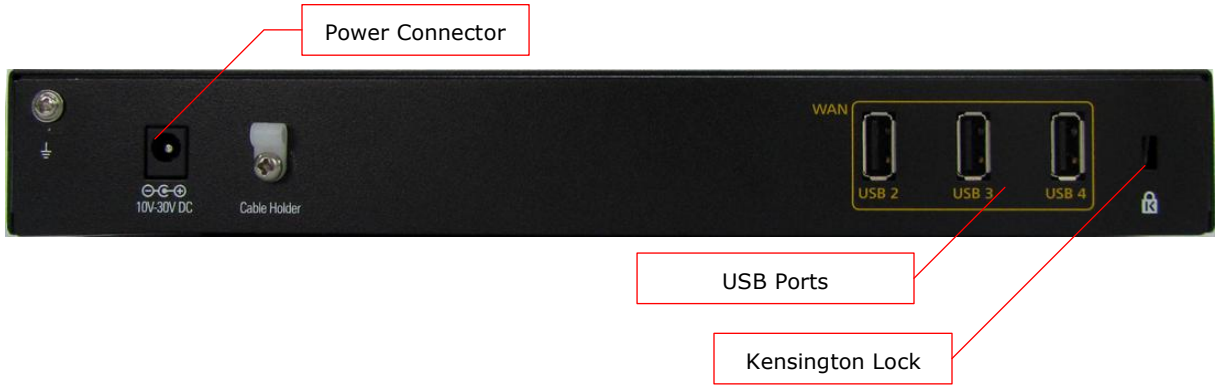
LAN and Ethernet WAN Ports		
Green LED	ON	1000 Mbps
	OFF	10/100 Mbps
Yellow LED	Solid	Port is connected without traffic
	Blinking	Data is transferring
	OFF	Port is not connected
Port Type	Auto MDI/MDI-X ports	

4.2.3 Rear Panel Appearance



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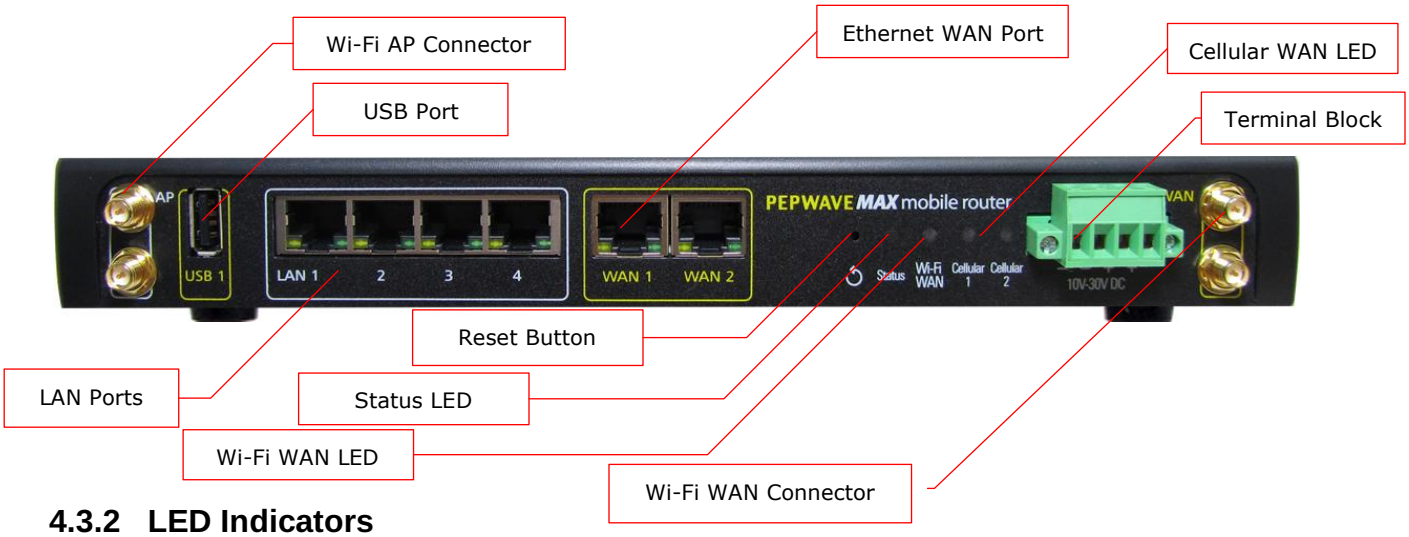
4.3 MAX HD2

4.3.1 Front Panel Appearance



4.3.2 LED Indicators

The statuses indicated by the Front Panel LEDs are as follows:

Status Indicators		
Status	OFF	System initializing
	Red	Booting up or busy
	Green	Ready state

Wi-Fi AP and Wi-Fi WAN Indicators		
Wi-Fi WAN / Cellular 1 / Cellular 2	OFF	Disabled Intermittent
	Blinking	Trying to connect but not connected to any wireless network
	ON	Connected to wireless network(s) without traffic
	Continuous Blinking	Transferring data

LAN and Ethernet WAN Ports		
Green LED	ON	1000 Mbps
	OFF	10/100 Mbps
Yellow LED	Solid	Port is connected without traffic
	Blinking	Data is transferring
	OFF	Port is not connected
Port Type	Auto MDI/MDI-X ports	

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4.3.3 Rear Panel Appearance

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5 Installation

Connecting the Network with Pepwave MAX Mobile Router:

5.1 Preparation

Before installing Pepwave MAX Mobile Router, please prepare the following:

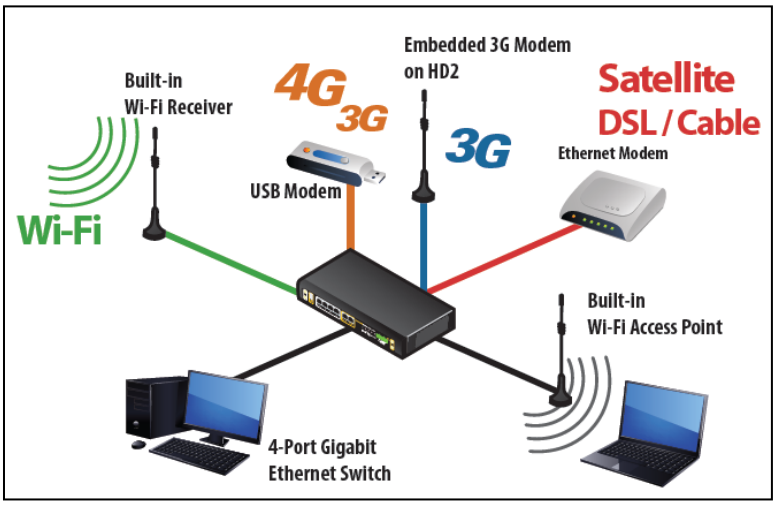
- At least one Internet/WAN access account and/or Wi-Fi access information.
- For each network connection,
  - **Ethernet WAN**: A 10/100/1000 BaseT UTP cable with RJ45 connector
  - **USB**: A USB modem
  - **Embedded Modem**: A SIM card for GSM/HSPA service
  - **Wi-Fi WAN**: Wi-Fi antennas
  - **PC Card / Express Card WAN:** A PC Card/Express Card for the corresponding card slot.
- A computer with TCP/IP network protocol and a web browser installed. Supported browsers include Microsoft Internet Explorer 8.0 or above, Mozilla Firefox 10.0 or above, Apple Safari 5.1 or above, and Google Chrome 18 or above.

5.2 Constructing the Network

At the high level, construct the network according to the following steps:

1. With an Ethernet cable, connect a computer to one of the LAN ports on the Pepwave MAX. Repeat with different cables for up to 4 computers to be connected.
2. With another Ethernet cable or a USB modem / Wi-Fi antenna / PC Card / Express Card, connect it to one of the WAN ports on the Pepwave MAX. Repeat the same procedure for other WAN ports.
3. Connect the power adapter to the power connector on the rear panel of Pepwave MAX, and then plug it into a power outlet.

The following figure schematically illustrates the configuration that results:



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5.3 Configuring the Network Environment

To ensure that Pepwave MAX works properly in the LAN environment and can access the Internet via the WAN connections, please refer to the following setup procedures:

- LAN Configuration

  For basic configuration, refer to Section 6, Connecting to Web Admin Interface.

  For advanced configuration, go to Section 7, Configuration of LAN Interface(s).

- WAN Configuration

  For basic configuration, refer to Section 6, Connecting to Web Admin Interface.

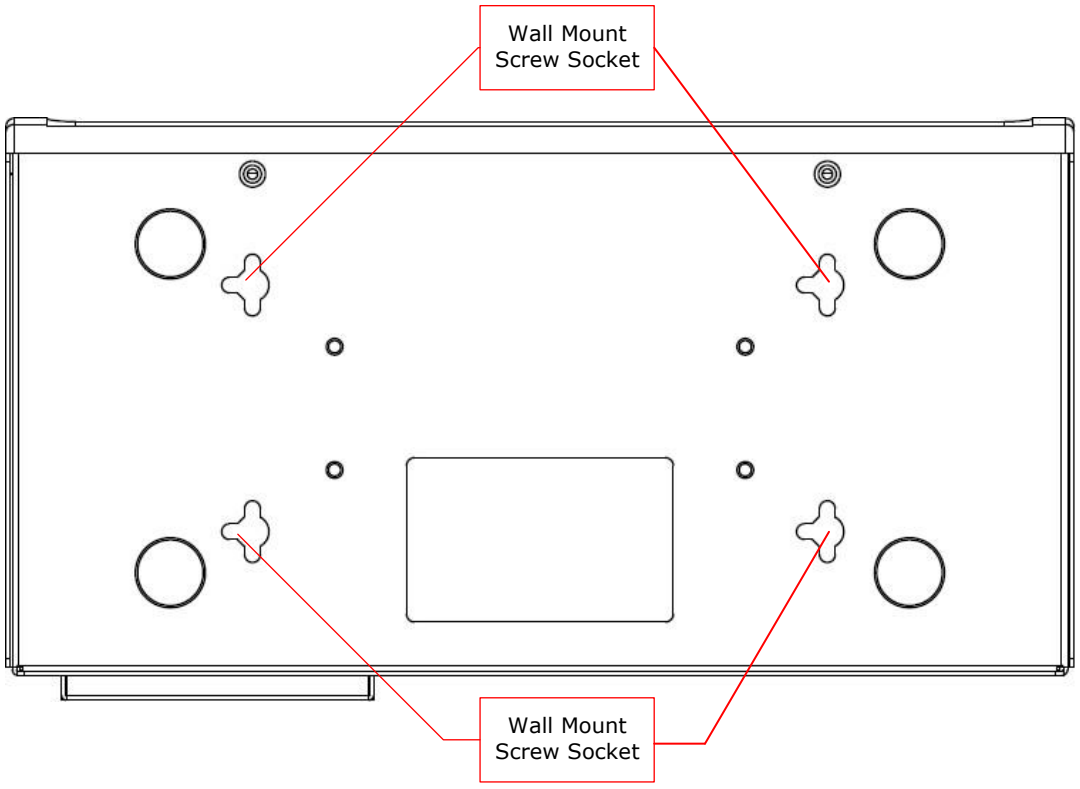
  For advanced configuration, go to Section 8, Configuration of WAN Interface(s).

5.4 Mounting the Unit

5.4.1 Wall Mount

Pepwave MAX can be mounted on the wall by screwing. After adding the screw on the wall, slide the MAX in the screw whole socket as indicated below.

Recommeneded Screw Specification: M3.5 x 20mm, Head Diameter 6mm, Head Thickness 2.4mm



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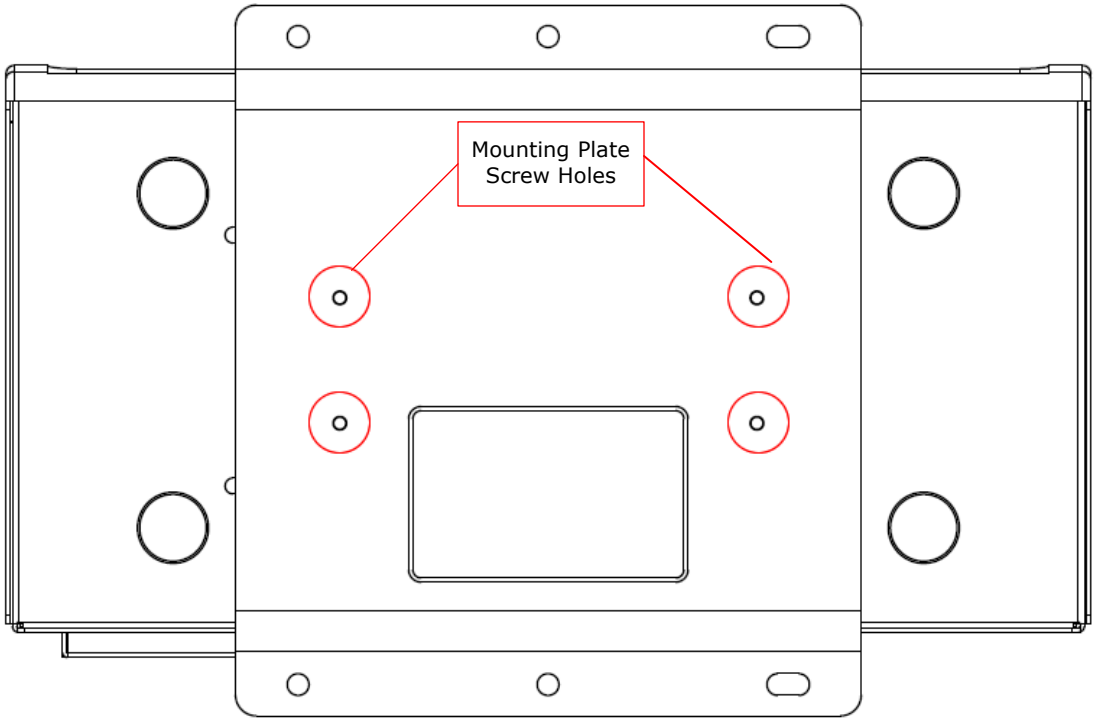
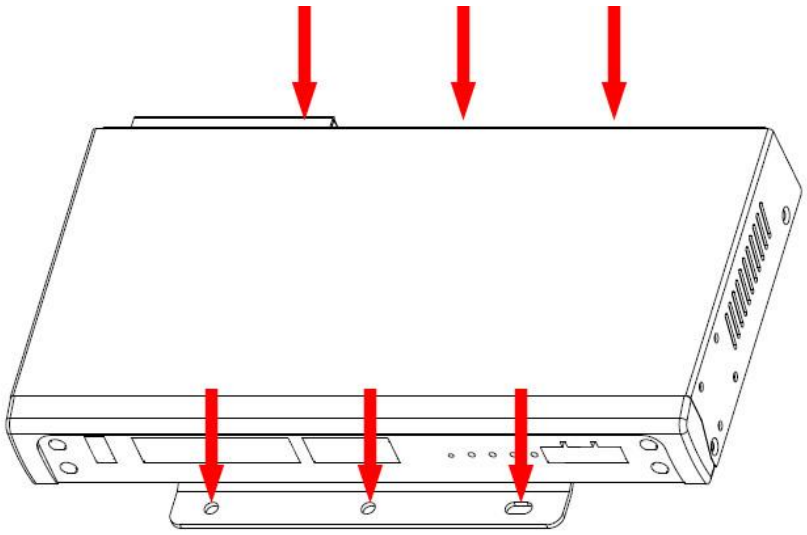
5.4.2 Car Mount

Pepwave MAX can be mounted on a flat surface using the included car mounting plate. Place the car mount according the label's direction, and screw it onto the device.



After mounting the plate on the back of the device, add screw on the plate on the flat surface.



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6 Connecting to Web Admin Interface

1. Start a web browser on a computer that is connected with Pepwave MAX through LAN.
2. To connect to Web Admin Interface of Pepwave MAX, enter the following LAN IP address in the address field of the web browser:

   http://192.168.50.1

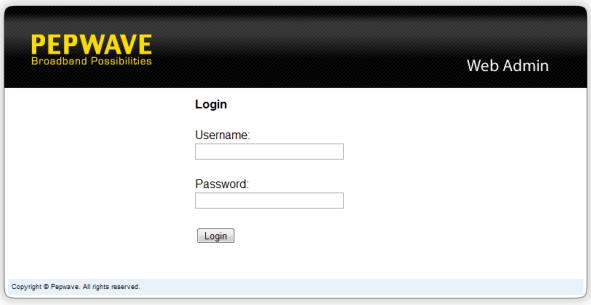
   (This is the default LAN IP address of Pepwave MAX.)

3. Enter the following to access the Web Admin Interface.

   Username: admin

   Password: admin

   (This is the default Username and Password of Pepwave MAX. The Admin and Read-only User Password can be changed at ***System > Admin Security*** of the Web Admin Interface.)



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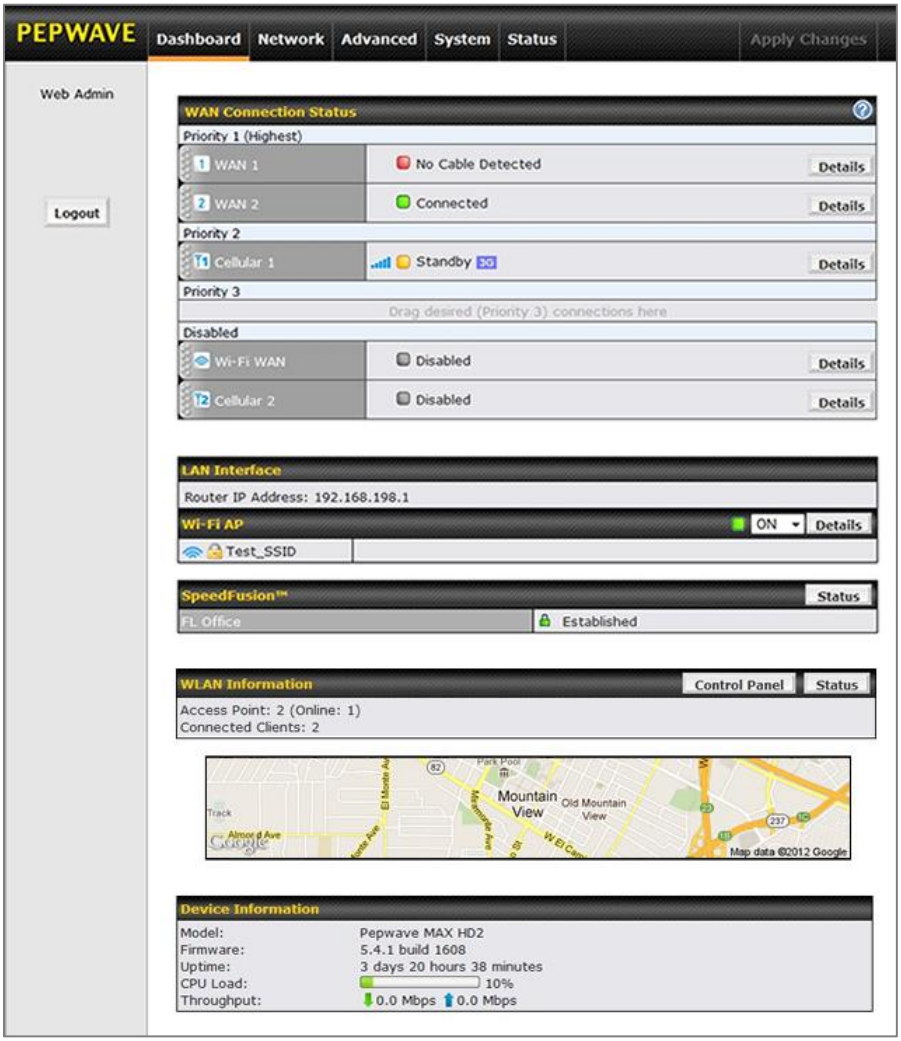
4. After successful login, the ***Dashboard*** of Web Admin Interface will be displayed. It looks similar to the following:



Dashboard shows the current WAN, LAN, Wi-Fi AP settings and statuses. You can simply change priority of WAN connections and switch on / off Wi-Fi AP in here. For further information about how-to set up these connections, please refer to Section 7.2 and 8.

A map with real-time GPS data is shown on the *Dashboard* when GPS signal is received. (HD2 only)

Device Information shows the details about the device, including Model name, Firmware version and Uptime. For further information please refer to Section 19.

Important Note
Configuration changes (e.g. WAN, LAN, Admin settings, etc.) will only take effect after clicking the **Save** button at the bottom of each page. The **Apply Changes** button causes the changes to be saved and applied.

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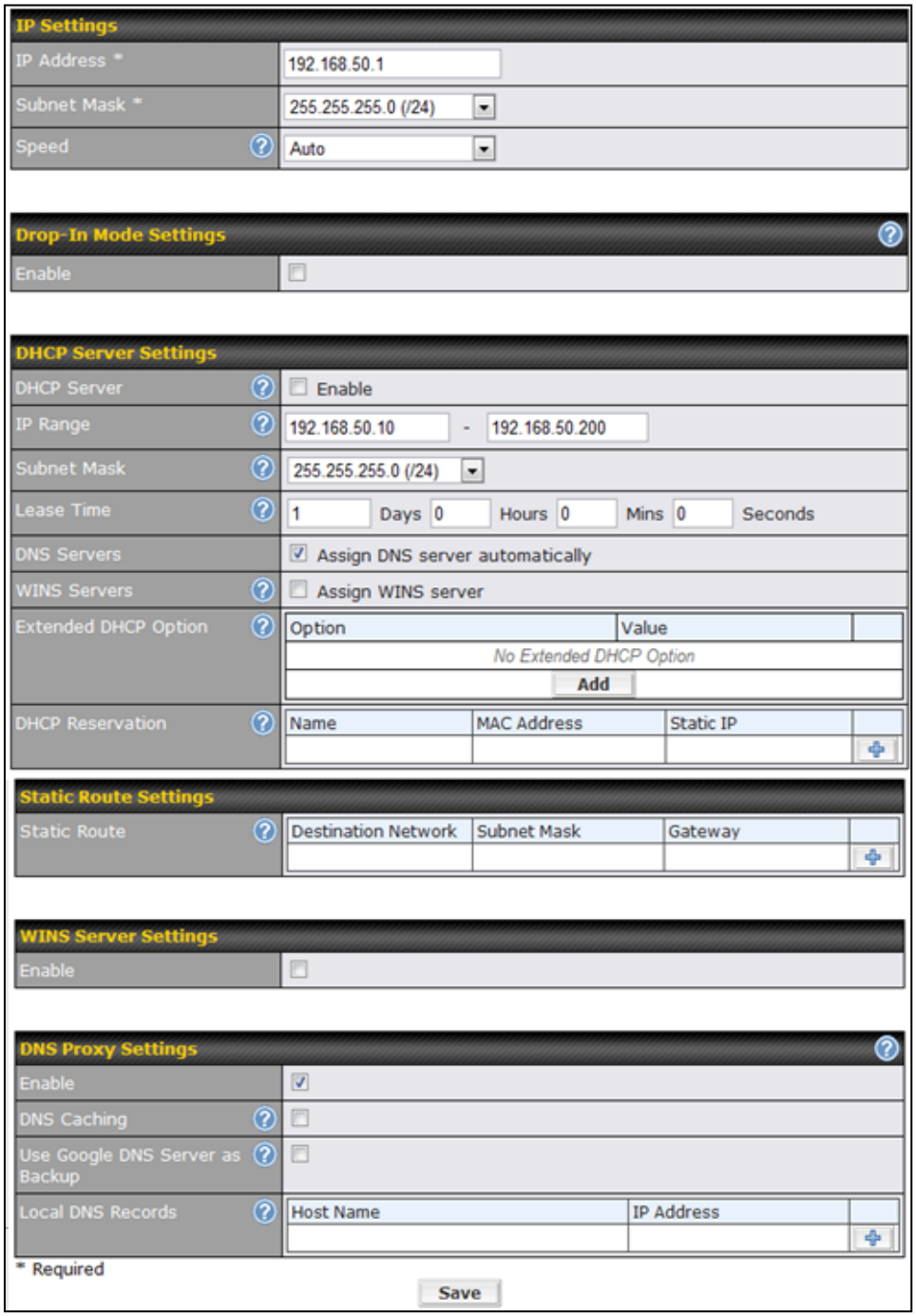
7 Configuration of LAN Interface(s)

7.1 Basic Settings

The LAN Interface settings are located in ***Network > LAN > Basic Settings***



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IP Settings	
IP Address & Subnet Mask	The IP address of Pepwave MAX on LAN.
Speed	This setting specifies the speed of the LAN Ethernet Port. By default, **Auto** is selected and the appropriate data speed is automatically detected by Pepwave MAX. In the event of negotiation issues, the port speed can be manually specified to circumvent the issues. You can also choose whether or not to advertise the speed to the peer by selecting the **Advertise Speed** checkbox.

DHCP Server Settings	
DHCP Server	When this setting is enabled, the DHCP server of Pepwave MAX automatically assigns an IP address to each computer that is connected via LAN and is configured to obtain an IP address via DHCP. Pepwave MAX's DHCP server can prevent IP address collision on LAN.
IP Range & Subnet Mask	This setting allocates a range of IP address that will be assigned to LAN computers by the DHCP server of Pepwave MAX.
Lease Time	This setting specifies the length of time throughout which an IP address of a DHCP client remains valid. Upon expiration of the Lease Time, the assigned IP address will no longer be valid and the renewal of the IP address assignment will be required.
DNS Servers	This option allows you to input the DNS server addresses to be offered to the DHCP clients. If **Assign DNS server automatically** is selected, the Pepwave MAX's built-in DNS server address (i.e. LAN IP address) will be offered.
WINS Server	This option allows you to specify the Windows Internet Name Service (WINS) server. You may choose to use the **built-in WINS server** or **external WINS servers**. When this unit is SpeedFusion™ connected, other VPN peers can share this unit's built-in WINS server by entering this unit's LAN IP address in their DHCP WINS Servers setting. Therefore, all PC clients in the VPN can resolve the NetBIOS names of other clients in remote peers. If you have enabled this option, a list of WINS clients will be displayed at ***Status > WINS Clients***.
Extended DHCP Option	In addition to standard DHCP options (e.g. DNS server address, gateway address, subnet mask), you can specify the value of additional Extended DHCP Options defined in RFC 2132. In this case, you can pass additional configuration information to LAN hosts. To define an Extended DHCP Option, click the **Add** button, choose the option that you want to define and enter its value. For values that are in IP address list format, you can enter one IP address per line in the provided text area input control. Each option is allowed to be defined once only.
DHCP Reservation	This setting reserves the assignment of fixed IP addresses for a list of computers on the LAN. The computers to be assigned fixed IP addresses on the LAN are identified by their MAC addresses. The fixed IP address assignment is displayed as a cross-reference list between the computers' Name, MAC addresses and fixed IP addresses. The field Name (an optional field) is for you to define a name to represent the device. MAC addresses should be in the format of **00:AA:BB:CC:DD:EE** Press to create a new record. Press to remove a record

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	Reserved clients information can be imported from the Client List, located at ***Status > Client List***. For more details, please refer to section 19.3.

Static Route Settings	
Static Route	This table is for defining static routing rules for the LAN segment. A static route consists of the network address, subnet mask, and gateway address. The address and subnet mask values are in the format of w.x.y.z The local LAN subnet and subnets behind the LAN will be advertised to the VPN. Remote routes sent over the VPN will also be accepted. Any VPN member will be able to route to the local subnets. Press to create a new route. Press to remove a route.

WINS Server Settings	
Enable	Check the box to enable the WINS Server. A list of WINS clients will be displayed at **Status > WINS Clients**.

DNS Proxy Settings	
Enable	A check box to enable to DNS Proxy feature. ***Network > LAN > DNS Proxy Settings table*** A DNS proxy server can be enabled to serve DNS requests originating from LAN/PPTP/ SpeedFusion™ peers. Requests are forwarded to the **DNS servers/resolvers** defined in each WAN connection
DNS Caching	This field is to enable DNS caching on the built-in DNS proxy server. When the option is enabled, queried DNS replies will be cached until the records' TTL has been reached. This feature can help improve the DNS lookup time. However, it cannot return the most updated result for those frequently updated DNS records. By default, it is **disabled**.
Include Google Public DNS Servers	When this option is **enabled**, the DNS proxy server will also forward DNS requests to Google's Public DNS Servers in addition to the DNS servers defined in each WAN. This could increase the DNS service's availability. Default: **disabled**
Local DNS Records	This table is for defining custom local DNS records. A static local DNS record consists of a Host Name and an IP Address. When looking up the Host Name from the LAN to LAN IP of Pepwave MAX, the corresponding IP Address will be returned. Press to create a new record. Press to remove a record.

LAN DNS Resolver Settings	
Enable	Check the box to enable the WINS Server. A list of WINS clients will be displayed at ***Network > LAN > DNS Proxy Settings > DNS Resolvers***. This field specifies which DNS resolvers will receive forwarded DNS requests. If no WAN/VPN/LAN DNS resolver is selected, all of the WAN's DNS resolvers will be selected.

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If a SpeedFusion™ peer is selected, you may enter the VPN peer's DNS resolver IP address(es).

Queries will be forwarded to the selected connections' resolvers. If all of the selected connections are down, queries will be forwarded to all resolvers on healthy WAN connections.

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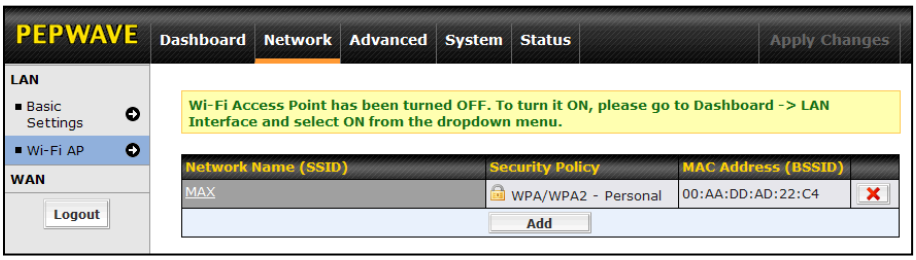
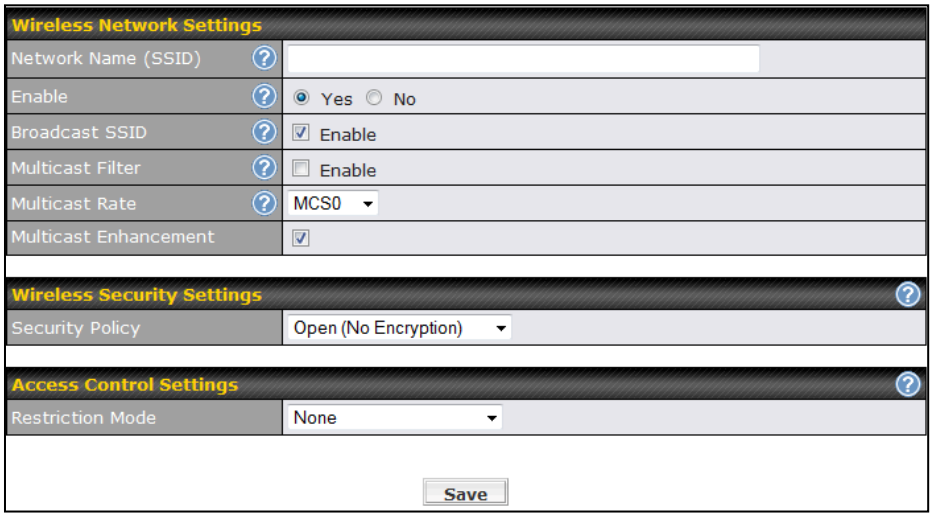
7.2 Wi-Fi AP

The Wi-Fi LAN settings can be configured in ***Network > LAN > Wi-Fi AP***:

Wi-Fi AP can also be switched on / off on the Dashboard.



Click **Add** button to create a new SSID.



Wireless Network Settings	
Network Name (SSID)	This setting allows you to specify a name to represent the virtual AP to be scanned by Wi-Fi clients.
Enable	When **Yes** is selected, this virtual AP is enabled. Select **No** to disable it. By default, it is enabled. You can also choose to enable or disable this virtual AP on the Dashboard - Connection Status of Wi-Fi AP, please refer to section 6 for information.
Broadcast SSID	When the box **Enable** is checked, this SSID can be scanned by Wi-Fi clients. By default, it is **enabled**.
Multicast Filter	When the box **Enable** is checked, multicast network traffic to the wireless SSID will be filtered. By default, it is **disabled**.
Multicast Rate	This field allows you to specify the transmit rate to be used for sending multicast network traffic. By default, Multicast Rate is set to**1M**.

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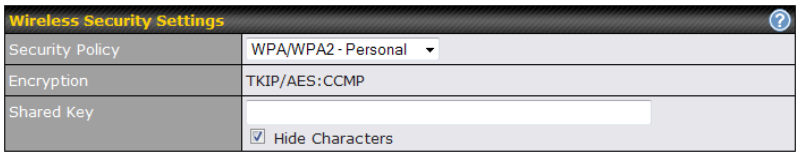
Wireless Security Settings

Security Policy

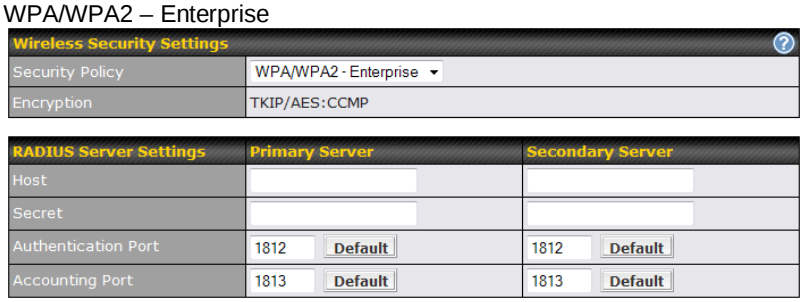
This setting specifies which security policy will be used for this wireless network.
Available options:

- Open (No Encryption)

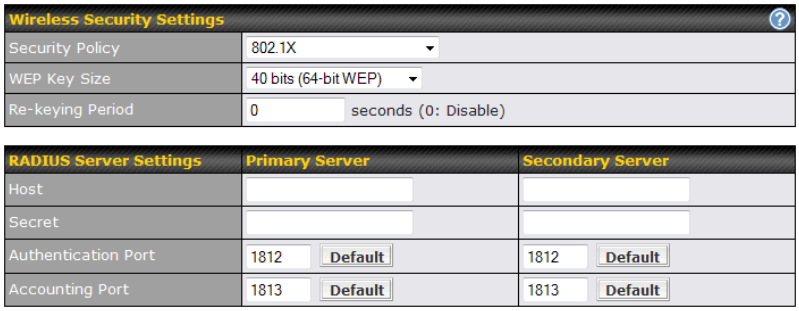
- WPA/WPA2 – Personal



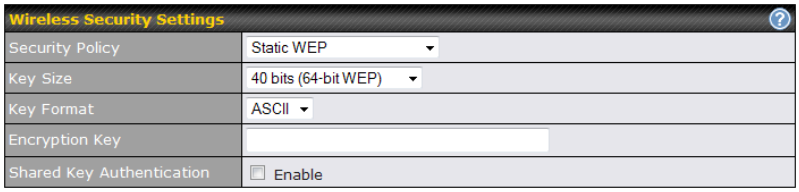
- WPA/WPA2 – Enterprise



- 802.1X

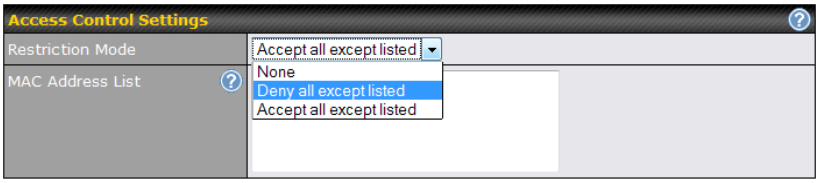


- Static WEP



Access Control Settings

Restriction Mode



This option allows you to perform access control through MAC address filtering.
Available options are **None**, **Deny all except listed**, and **Accept all except listed**.

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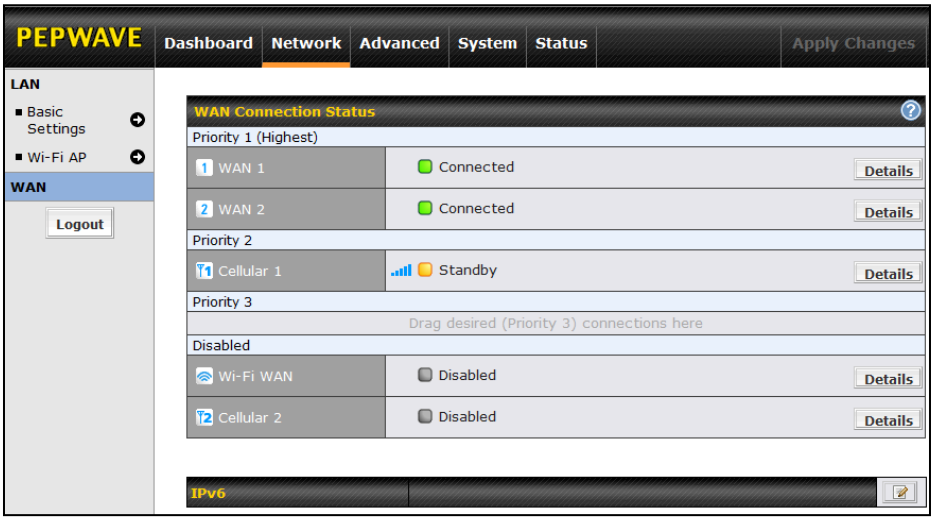
8 Configuration of WAN Interface(s)

The WAN Interface settings are located at: ***Network > WAN***

To reorder different WANs' priority, just drag on the appropriate WAN by holding the left mouse button, move it to the desired priority (the first one would be the highest priority, the second one would be lower priority and so on) and drop it by releasing the mouse button.



To disable a particular WAN connection, just drag on the appropriate WAN by holding the left mouse button, move it the **Disabled** row and drop it by releasing the mouse button.

You can also do the above priority setting on the ***Dashboard***, please refer to Section 6 for information.

Click the **Details** button in the corresponding row of connection to modify the connection setting.

Important Note
Connection Details will be changed and become effective right after clicking the **Save and Apply** button.

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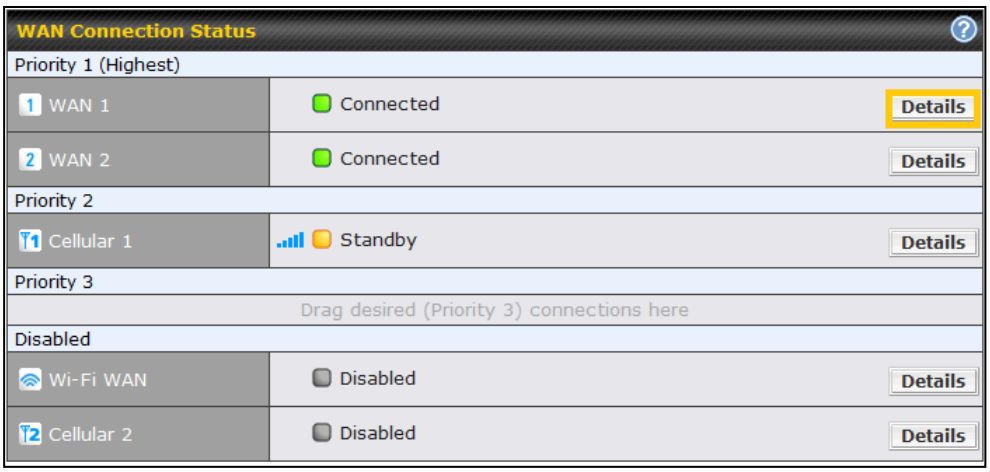
8.1 Ethernet WAN

Network > WAN > Click on WAN Details



This will open a screen similar to shown below

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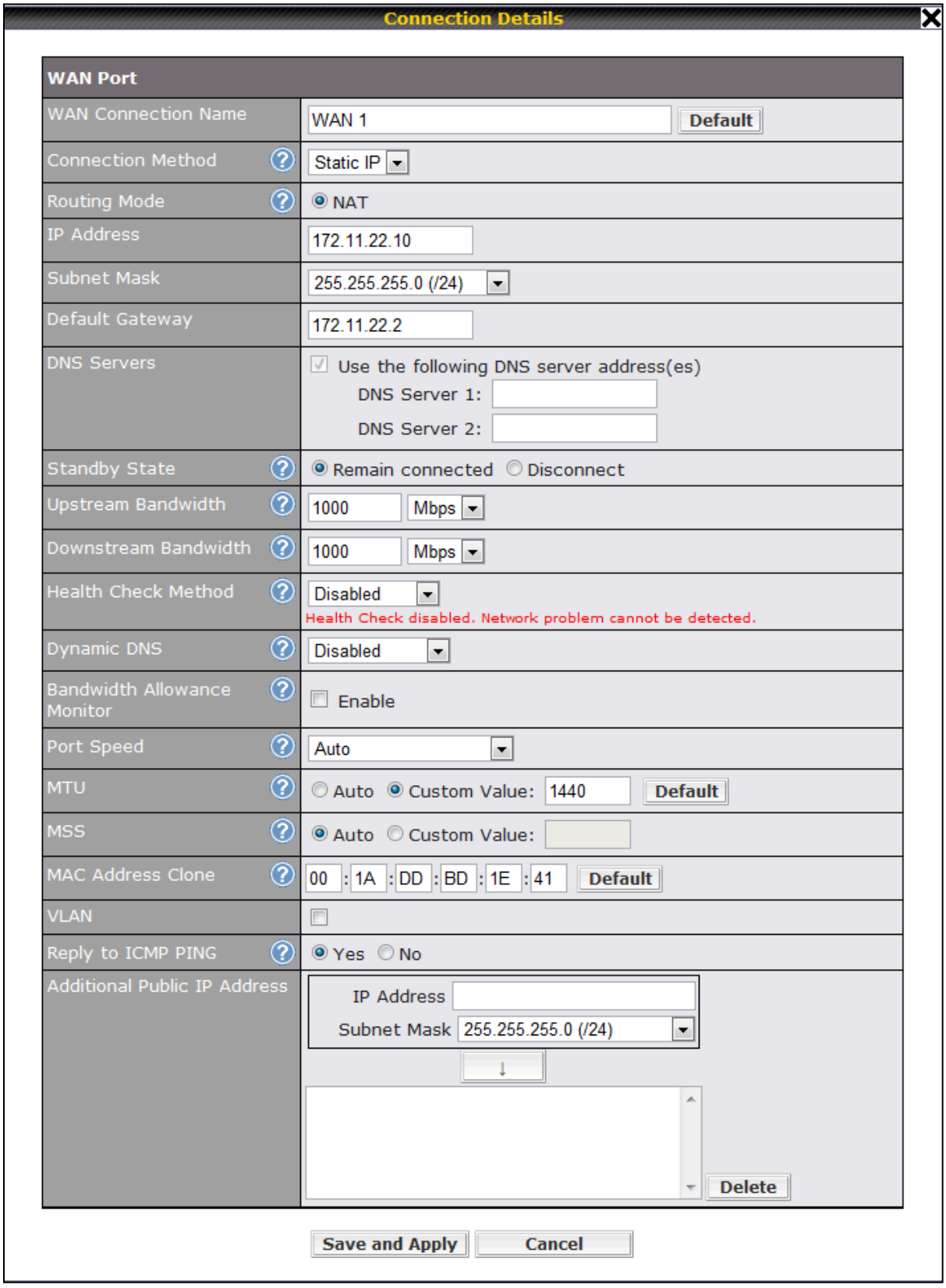

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Ethernet WAN Settings	
WAN Connection Name	This field is for defining a name to represent this WAN connection.
Connection Method	There are three possible connection methods for Ethernet WAN: • **DHCP** • **Static IP** • **PPPoE** The connection method and details are determined by, and can be obtained from, the ISP. See the Sections 8.1.1, 8.1.2, and 8.1.3 for details of each connection method.
Standby State	This setting specifies the state of the WAN connection. The available options are **Remain connected** and **Disconnect**. The default state is **Remain Connected**.
Upstream Bandwidth	This setting specifies the data bandwidth in the outbound direction from the LAN through the WAN interface.
Downstream Bandwidth	This setting specifies the data bandwidth in the inbound direction from the WAN interface to the LAN. This value is referenced as the default weight value when using the algorithm **Least Used**, or the algorithm **Persistence (Auto)** in Outbound Policy with **Managed by Custom Rules** chosen (see Section 12.2).
Health Check Method	This setting specifies the health check method for the WAN connection. The value of method can be configured as **Disabled**, **Ping** or **DNS Lookup**. The default method is **Disabled**. See Section 8.4 for configuration details.
Dynamic DNS	This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers: • changeip.com • dyndns.org • no-ip.org • tzo.com • DNS-O-Matic Select **Disabled** to disable this feature. See Section 8.1.4 for configuration details.
Bandwidth Allowance Monitor	This option allows you to enable bandwidth usage monitoring on this WAN connection for each billing cycle. When this is not enabled, bandwidth usage of each month is still being tracked but no action will be taken. See Section 8.5 for configuration details.
Port Speed	This setting specifies port speed and duplex configurations of the WAN Port. By default, **Auto** is selected and the appropriate data speed is automatically detected by

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	Pepwave MAX. In the event of negotiation issues, the port speed can be manually specified to circumvent the issues. You can also choose whether or not to advertise the speed to the peer by selecting the **Advertise Speed** checkbox.
MTU	This setting specifies the Maximum Transmission Unit. By default, MTU is set to **Custom 1440**. You may adjust the MTU value by editing the text field. Click **Default** to restore the default MTU value. Select **Auto** and the appropriate MTU value will be automatically detected. The auto-detection will run each time when the WAN connection establishes.
MSS	This setting should be configured based on the maximum payload size that the local system can handle. The MSS (Maximum Segment Size) is computed from the MTU minus 40 bytes for TCP over IPv4. If MTU is set to Auto, the MSS will also be set automatically. By default, MSS is set to **Auto**.
MAC Address Clone	This setting allows you to configure the MAC address. Some service providers (e.g. cable providers) identify the client's MAC address and require the client to always use the same MAC address to connect to the network. In such cases, change the WAN interface's MAC address to the original client PC's one via this field. The default MAC Address is a unique value assigned at the factory. In most cases, the default value is sufficient. Clicking the Default button restores the MAC Address to the default value.
Reply to ICMP PING	If this field is disabled, the WAN connection will not respond to ICMP PING requests. By default, this is **enabled**.
Additional Public IP Address	The IP Address List represents the list of fixed Internet IP addresses assigned by the ISP, in the event that more than one Internet IP addresses are assigned to this WAN connection. Enter the fixed Internet IP addresses and the corresponding subnet mask, and then click the Down Arrow button to populate IP address entries to the IP Address List.
IPv6	
IPv6	IPv6 support can be enabled on one of the available Ethernet WAN ports. On this screen, you can choose which WAN will support IPv6. To enable IPv6 support on a WAN, the WAN router must respond to Stateless Address Auto configuration advertisements and DHCPv6 requests. IPv6 clients on the LAN will acquire their IPv6, gateway, and DNS server addresses from it. The device will also acquire an IPv6 address for performing ping/traceroute checks and accepting web admin accesses. Note: This feature is only available on Pepwave MAX 700 and HD2.

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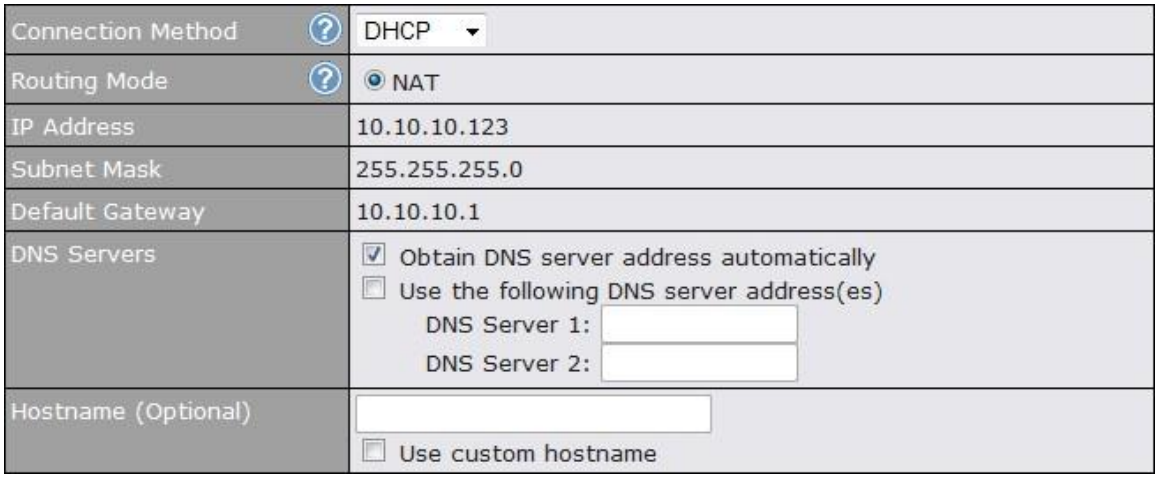
8.1.1 DHCP Connection

The DHCP connection method is suitable if the ISP provides an IP address automatically by DHCP (e.g. Satellite Modem, WiMAX Modem, Cable, Metro Ethernet, etc.).

There are three possible connection methods:

1. DHCP
2. Static IP
3. PPPoE



DHCP Settings	
Routing Mode	This is to substitute the real address in a packet with a mapped address that is routable on the destination network
IP Address/ Subnet Mask/ Default Gateway	This information is obtained from the ISP automatically.
DNS Servers	Each ISP may provide a set of DNS servers for DNS lookups. This setting specifies the DNS (Domain Name System) Servers to be used when a DNS lookup is routed through this connection. Selecting **Obtain DNS server address automatically** results in the DNS Servers to be assigned by the WAN DHCP Server to be used for outbound DNS lookups over the connection. (The DNS Servers are obtained along with the WAN IP address assigned from the DHCP server.) When **Use the following DNS server address(es)** is selected, you may enter custom DNS server addresses for this WAN connection into the **DNS Server 1** and **DNS Server 2** fields.
Hostname (Optional)	If your service provider's DHCP server requires you to supply a hostname value upon acquiring an IP address, you may enter the value here. If your service provider does not provide you with the value, you can safely bypass this option.

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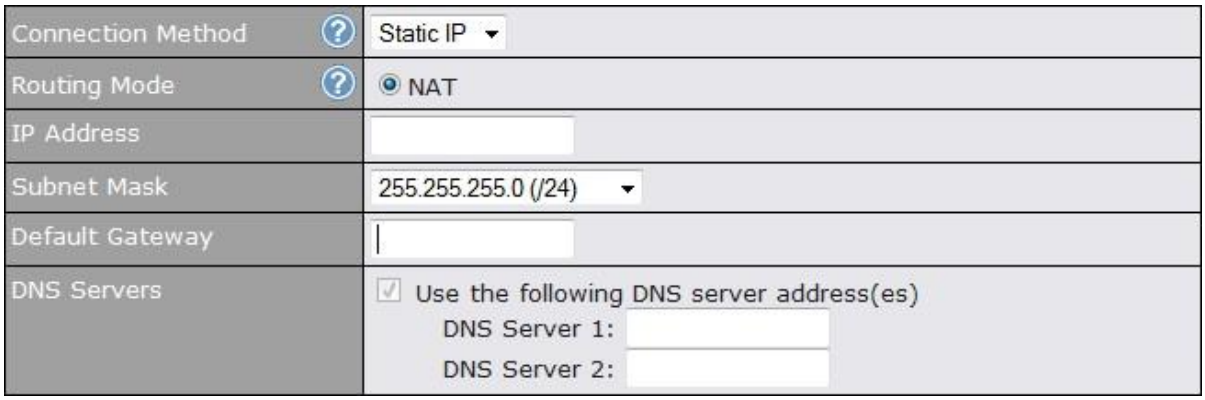
8.1.2 Static IP Connection

This Static IP connection method is suitable if ISP provides a static IP address to connect directly.



Static IP Settings	
Routing Mode	This is to substitute the real address in a packet with a mapped address that is routable on the destination network
IP Address / Subnet Mask / Default Gateway	These settings allow you to specify the information required in order to communicate on the Internet via a fixed Internet IP address. The information is typically determined by and can be obtained from the ISP.
DNS Servers	Each ISP may provide a set of DNS servers for DNS lookups. This field specifies the DNS (Domain Name System) Servers to be used when a DNS lookup is routed through this connection. You can input the ISP provided DNS server addresses into the **DNS Server 1** and **DNS Server 2** fields. If no address is entered here, this link will not be used for DNS lookups.

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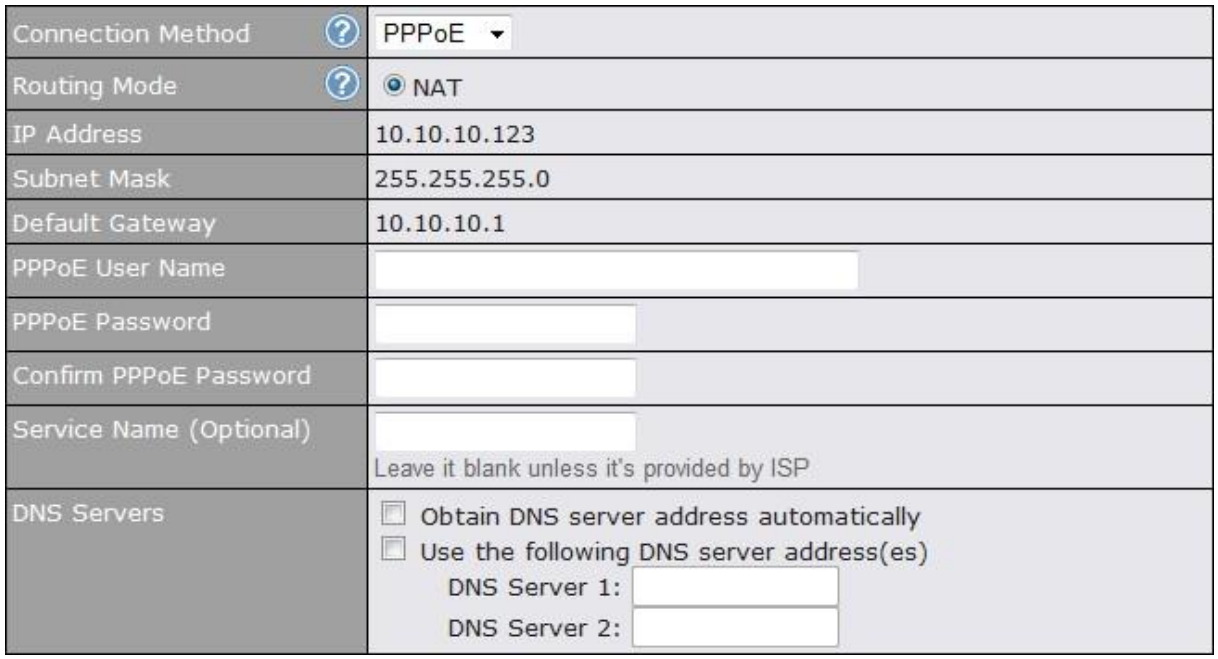
8.1.3 PPPoE Connection

This connection method is suitable if ISP provides login ID/ password to connect via PPPoE.



PPPoE Settings	
Routing Mode	This is to substitute the real address in a packet with a mapped address that is routable on the destination network
IP Address / Subnet Mask / Default Gateway	This information is obtained from the ISP automatically.
PPPoE User Name / Password	Enter the required information in these fields in order to connect via PPPoE to the ISP. The parameter values are determined by and can be obtained from the ISP.
Confirm PPPoE Password	Verify your password by entering it again in this field.
Service Name	Service Name is provided by the ISP. **Note: Leave this field blank unless it is provided by your ISP.**
DNS Servers	Each ISP may provide a set of DNS servers for DNS lookups. This setting specifies the DNS (Domain Name System) Servers to be used when a DNS lookup is routed through this connection. Selecting **Obtain DNS server address automatically** results in the DNS Servers assigned by the PPPoE server to be used for outbound DNS lookups over the WAN connection. (The DNS Servers are obtained along with the WAN IP address assigned from the PPPoE server.) When **Use the following DNS server address(es)** is selected, you can put custom DNS server addresses for this WAN connection into the **DNS Server 1 and DNS Server 2** fields.

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8.1.4 Dynamic DNS Settings

Pepwave MAX provides the functionality to register the domain name relationships to dynamic DNS service providers. Through registration with dynamic DNS service provider(s), the default public Internet IP address of each WAN connection can be associated with a host name. With Dynamic DNS service enabled for a WAN connection, you can connect to your WAN's IP address from the external even if its IP address is dynamic. You have to register for an account from the listed dynamic DNS service providers before enabling this option.

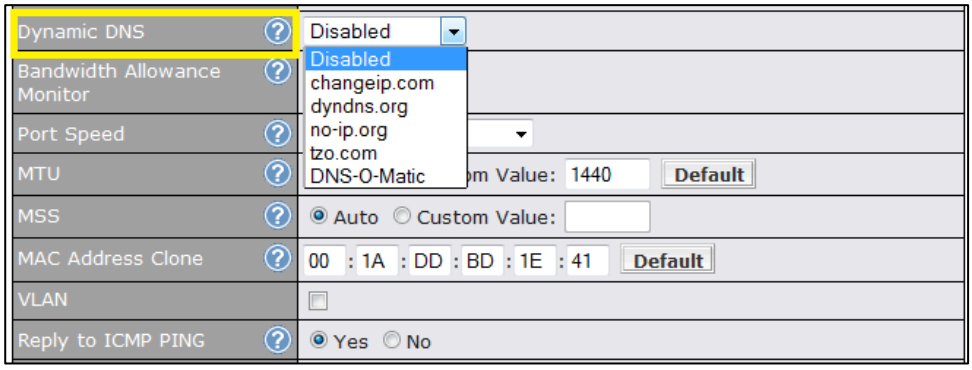
If the WAN connection's IP address is a reserved private IP address (i.e. behind a NAT router), the Public IP of each WAN will be automatically reported to the DNS service provider.

Either upon a change in IP addresses or every 23 days without link reconnection, Pepwave MAX will connect to the dynamic DNS service provider to perform an IP address update within the provider's records.

The settings for dynamic DNS service provider(s) and the association of host name(s) are configured via

Network > WAN > Click on WAN Detail

Either upon a change in IP address or every 23 days without link reconnection, Pepwave MAX will connect to the dynamic DNS service provider to perform an IP address update within the provider's records.



Dynamic DNS Settings	
Dynamic DNS	This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers: • changeip.com • dyndns.org • no-ip.org • tzo.com • DNS-O-Matic Select **Disabled** to disable this feature.
Account Name / Email Address	This setting specifies the registered user name for the dynamic DNS service.
Password / TZO Key	This setting specifies the password for the dynamic DNS service.
Hosts / Domain	This field allows you to specify a list of host names or domains to be associated with the public Internet IP address of the WAN connection. If you need to enter more than one host, you can use a carriage return to separate them.

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Important Note

In order to use dynamic DNS services, appropriate host name registration(s) as well as a valid account with a supported dynamic DNS service provider are required.

A dynamic DNS update is performed whenever a WAN's IP address changes. E.g. IP is changed after a DHCP IP refresh, reconnection, etc.

Due to dynamic DNS service providers' policy; a dynamic DNS host will automatically expire if the host record has not been updated for a long time. Therefore Pepwave MAX performs an update every 23 days even if a WAN's IP address has not changed.

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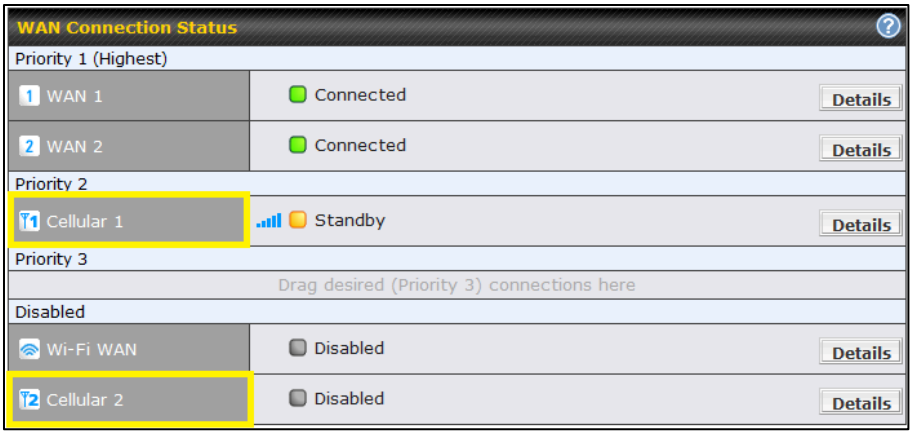
8.2 Cellular 1 / Cellular 2

Network > WAN > Click on Detail Details



(**Available on Pepwave MAX HD2 only)**

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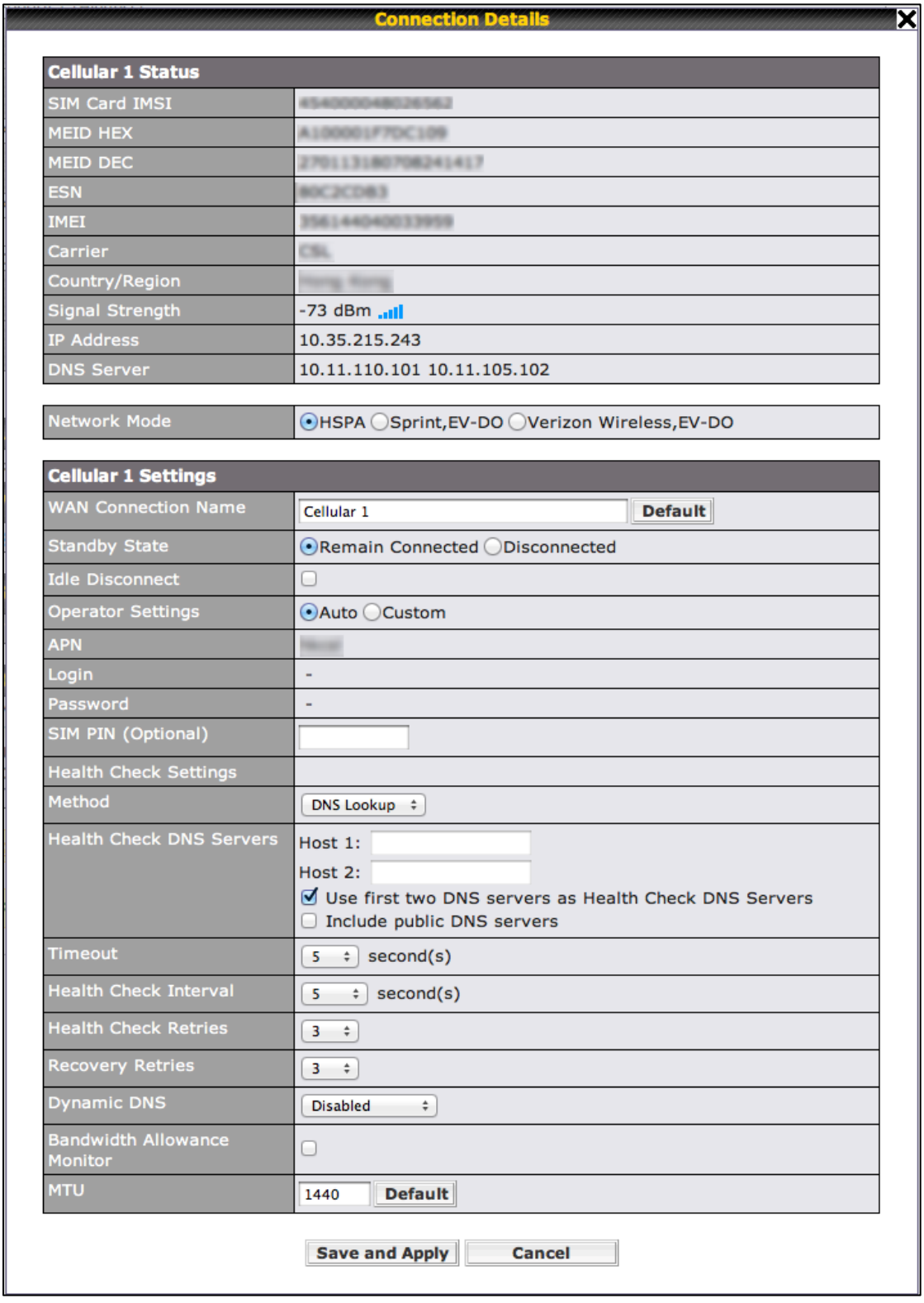

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Cellular 1 / Cellular 2	
SIM Card IMSI	This is the International Mobile Subscriber Identity which uniquely identifies the SIM card. This is applicable to 3G modems only.
MEID HEX	The Pepwave MAX supports both HSPA and EV-DO. For Sprint or Verizon Wireless EV-DO users, a unique MEID identifier code (in hexadecimal format) is used by the carrier to associate the EV-DO device with the user.
MEID DEC	This is the equivalent of the MEID HEX but in decimal format.
ESN	This serves the same purpose as MEID HEX but uses an older format.
IMEI	This is the unique ID for identifying the modem in GSM/HSPA mode.
Network Mode	Users have to specify the Network they are on accordingly.
WAN Connection Name	This field is for defining a name to represent this WAN connection.
Standby State	This option allows you to choose whether to remain the connection connected or disconnected when this WAN connection is no longer in the highest priority and has entered the standby state. When **Remain connected** is chosen, upon bringing up this WAN connection to active, it will be immediately available for use.
Idle Disconnect	When Internet traffic is not detected within the user specified timeframe, the modem will automatically disconnect. Once the traffic is resumed by the LAN host, the connection will be re-activated,
Operator Settings	This setting applies to 3G / EDGE / GPRS modem only. It does not apply to EVDO / EVDO Rev. A modem. This allows you to configure the APN settings of your connection. If **Auto** is selected, the mobile operator should be detected automatically. The connected device will be configured and connection will be made automatically afterwards. If there is any difficulty in making connection, you may select **Custom** to enter your carrier's **APN, Login, Password, and Dial Number** settings manually. The correct values can be obtained from your carrier. The default and recommended Operator Settings is **Auto**.
APN / Login / Password / SIM PIN	When **Auto** is selected, the information in these fields will be filled automatically. Select the option **Custom** and you may customize these parameters. The parameters values are determined by and can be obtained from the ISP.
Heath Checking Settings	This setting allows you to specify the health check method for the Cellular connection. The as available options are **Disabled** and **DNS Lookup.** The default method is **DNS Lookup**. See Section 8.4 for configuration details.
Bandwidth Allowance Monitor	This option allows you to enable bandwidth usage monitoring on this WAN connection for each billing cycle. When this is not enabled, bandwidth usage of each month is still being tracked but no action will be taken. See Section 8.5 for configuration details.

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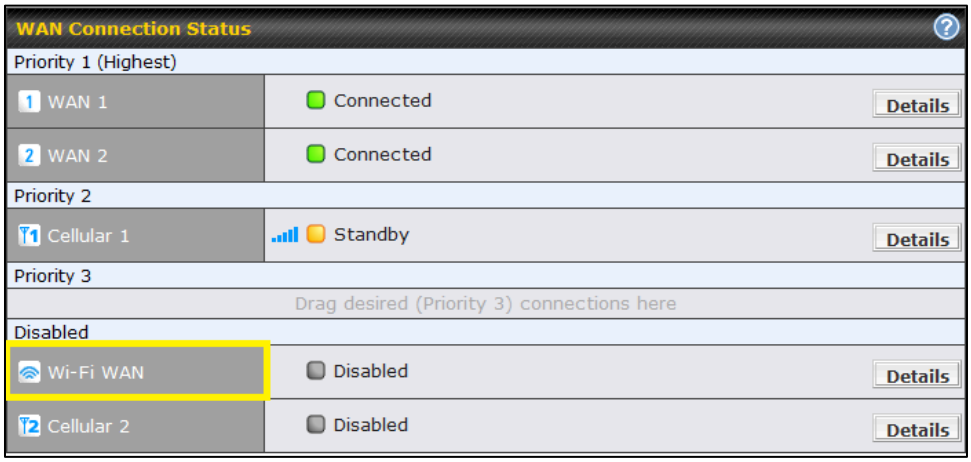
8.3 Wi-Fi WAN

Network > WAN > Click on Wi-Fi WAN Details



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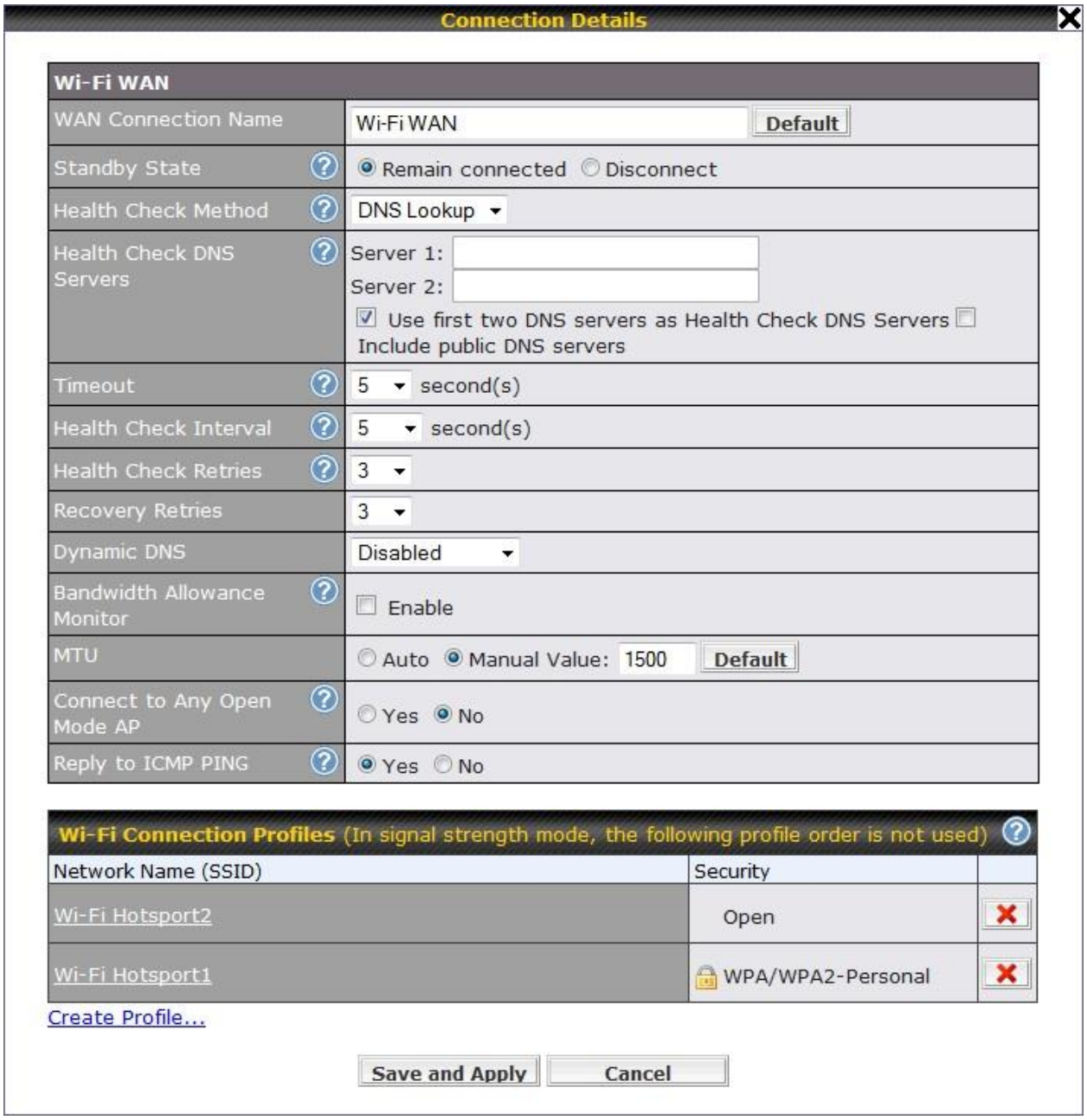

Wi-Fi WAN Settings	
WAN Connection Name	This field is for defining a name to represent this WAN connection.
Standby State	This setting specifies the state of the WAN connection while in standby. The available options are **Remain Connected** (hot standby) and **Disconnect** (cold standby).
Health Check Method	This setting allows you to specify the health check method for the WAN connection. The available options are **Disabled, Ping, and DNS Lookup**. The default method is **Disabled**.

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Dynamic DNS	See Section 8.4 for configuration details. This setting specifies the dynamic DNS service provider to be used for the WAN based on supported dynamic DNS service providers: • changeip.com • dyndns.org • no-ip.org • tzo.com • DNS-O-Matic Select Disabled to disable this feature.
Bandwidth Allowance Monitor	This option allows you to enable bandwidth usage monitoring on this WAN connection for each billing cycle. When this is not enabled, bandwidth usage of each month is still being tracked but no action will be taken. See Section 8.5 for configuration details.
MTU	This setting specifies the Maximum Transmission Unit. By default, MTU is set to **Custom 1440**. You may adjust the MTU value by editing the text field. Click **Default** to restore the default MTU value. Select **Auto** and the appropriate MTU value will be automatically detected. The auto-detection will run each time when the WAN connection establishes
Connect to Any Open Mode AP	This option is to specify whether the Wi-Fi WAN will connect to any open mode access point it finds. By default, this is **disabled**.
Reply to ICMP PING	If this field is disabled, the WAN connection will not respond to ICMP PING requests. By default, this is **enabled**.

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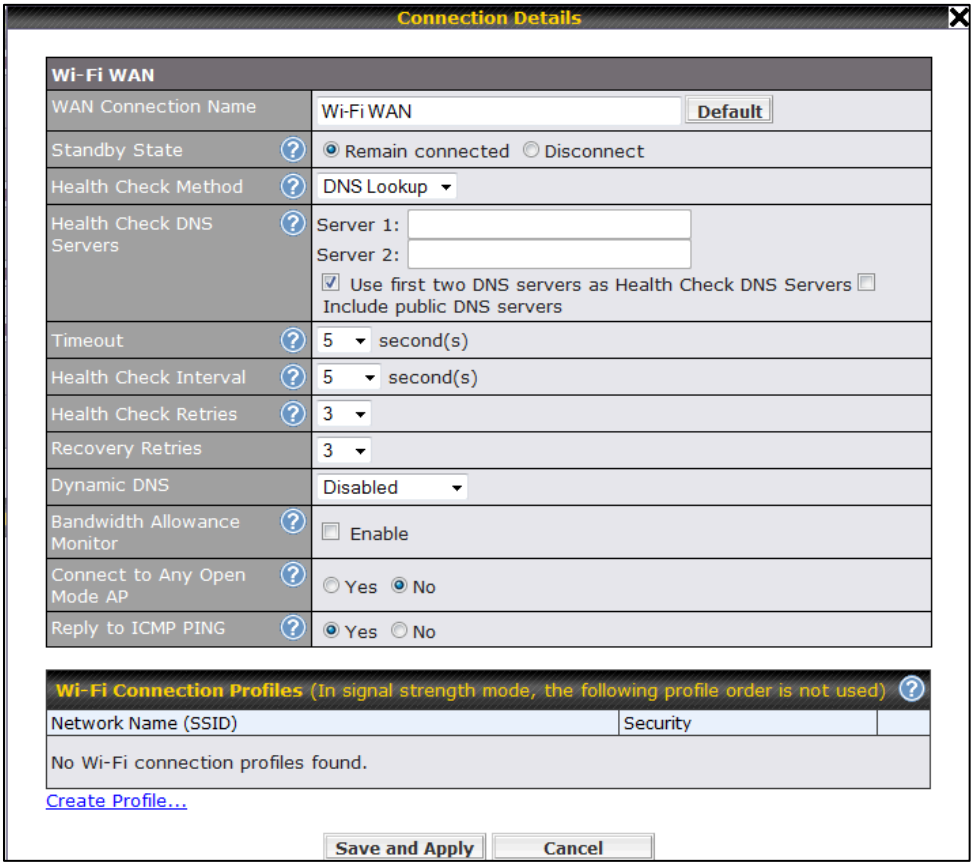
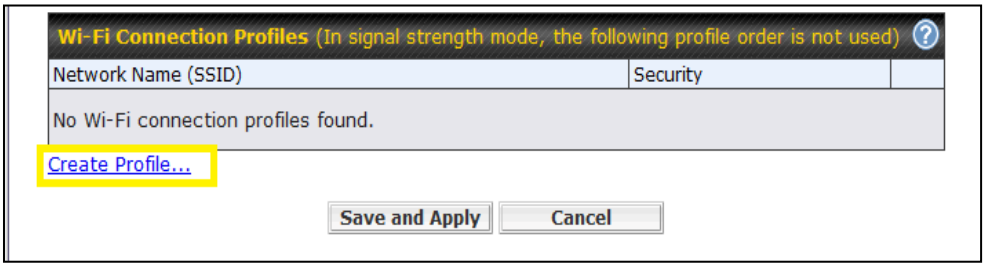
8.3.1 Create Wi-Fi Connection Profile

You can manually create a profile to connect to a Wi-Fi connection. It is useful for creating a profile for connecting to hidden-SSID access points. Click on the link **Create Profile…** and the following window will be displayed.

Network > WAN > Click on Detail Details



Click on **Create Profile**….


Wi-Fi Connection Profiles (In signal strength mode, the following profile order is not used)
Network Name (SSID)
Security
No Wi-Fi connection profiles found.
Create Profile...
Save and Apply
Cancel

This will open a window similar to the shown below

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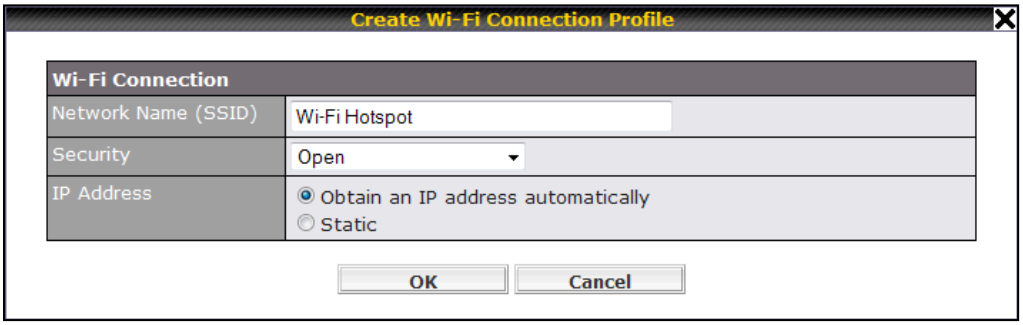

Create Wi-Fi Connection Profile Settings	
Network Name (SSID)	This field is for defining a name to represent this Wi-Fi connection.
Security	This option allows you to select which security policy is used for this wireless network. Available options: • **Open** • **WEP** • **WPA/WPA2 – Personal** • **WPA/WPA2 – Enterprise** The settings to be displayed under this row will vary depending on the selected security policy.

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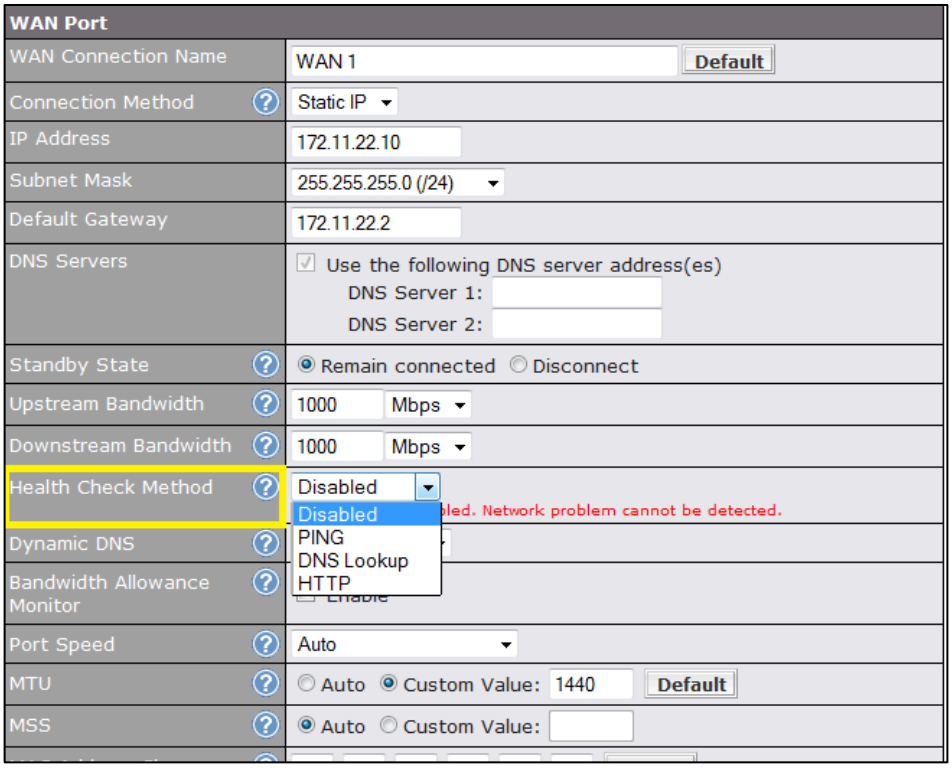
8.4 WAN Health Check

To ensure traffic is routed to healthy WAN connections only, Pepwave MAX provides the functionality to periodically check the health of each WAN connection.

The Health Check settings for each WAN connection can be independently configured via ***Network > WAN > Details***:



Enable the Health Check Settings by drop down to PING, DNS Lookup and HTTP

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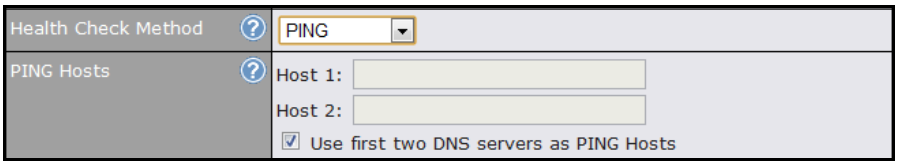
Health Check Settings	
Method	This setting specifies the health check method for the WAN connection. The value of Method can be configured as **Disabled**, **Ping** or **DNS Lookup**. The default method is **DNS Lookup**. For Mobile Internet connection, the value of Method can be configured as **Disabled** or **SmartCheck**.

Health Check Disabled

When **Disabled** is chosen in the Method field, the WAN connection will always be considered as up. The connection will not be treated as down in the event of IP routing errors.

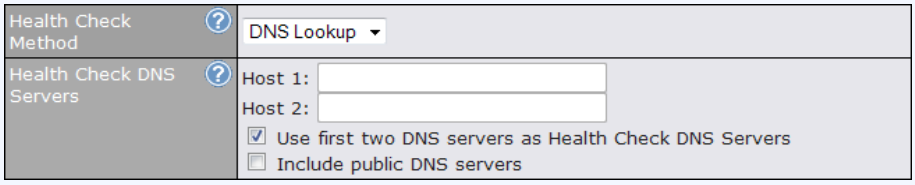
Health Check Method: PING



The ICMP PING packets will be issued to test the connectivity with a configurable target IP address or host name. A WAN connection is considered as up if PING responses are received from either one or both of the PING Hosts.

PING Hosts	This setting specifies IP addresses or host names with which connectivity is to be tested via ICMP Ping. If **Use first two DNS servers as Ping Hosts** is checked, the target PING Host will be the first DNS server for the corresponding WAN connection. Reliable PING hosts with a high uptime should be considered. By default, the first two DNS servers of the WAN connection are used as the PING Hosts.

Health Check Method: DNS Lookup



DNS lookups will be issued to test the connectivity with target DNS servers. The connection will be treated as up if DNS responses are received from either one or both of the servers, regardless of whether the result was positive or negative.

Health Check DNS Servers	This field allows you to specify two DNS hosts' IP address with which connectivity is to be tested via DNS Lookup. If **Use first two DNS servers as Health Check DNS Servers** is checked, the first two DNS servers will be the DNS lookup targets for checking a connection's health. If the box is not checked, field Host 1 must be filled and field Host 2 is optional. If the box **Include public DNS servers** is selected and no response is received from all specified DNS servers, DNS lookups will also be issued to some public DNS servers. A

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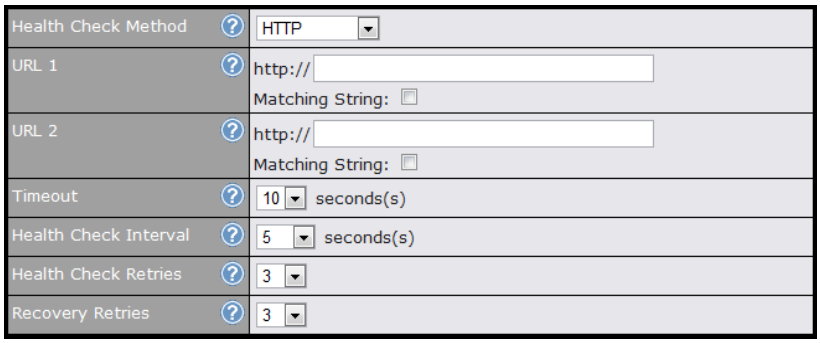
	WAN connection will be treated as down only if there is also no response received from the public DNS servers. Connections will be considered up if DNS responses are received from any one of the health check DNS servers, regardless of a positive or negative result. By default, the first two DNS servers of the WAN connection are used as the Health Check DNS Servers.
Health Check Method: HTTP	
URL 1	HTTP connections will be issued to test the connectivity with configurable URLs and strings to match. ***WAN Settings > WAN Edit > Health Check Settings > URL 1*** The URL will be retrieved when performing an HTTP health check. When *String to Match* is left blank, a health check will pass if the HTTP return code is between 200 and 299 (Note: HTTP redirection codes 301 or 302 are treated as failures). When *String to Match* is filled, a health check will pass if the HTTP return code is between 200 and 299 and if the HTTP response content contains the string
URL 2	 ***WAN Settings > WAN Edit > Health Check Settings > URL 2*** If URL 2 is also provided, a health check will pass if either one of the tests passed.

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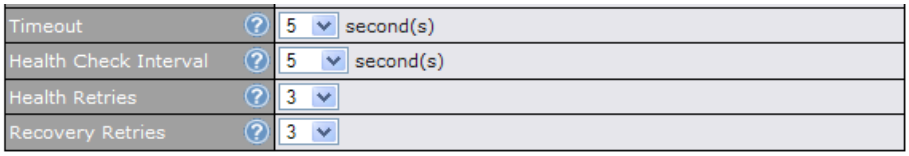
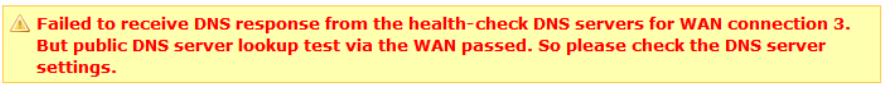
Other Health Check Settings



Timeout	This setting specifies the timeout, in seconds, for ping/DNS lookup requests. Default Timeout is set to **5** second.
Health Check Interval	This setting specifies the time interval, in seconds, between ping or DNS lookup requests. Default Health Check Interval is **5** seconds.
Health Check Retries	This setting specifies the number of consecutive ping/DNS lookup timeouts after which Pepwave MAX is to treat the corresponding WAN connection as down. Default Health Retries is set to **3**. For example, with the default Health Retries setting of 3, after consecutive 3 timeouts, the corresponding WAN connection will be treated as down.
Recovery Retries	This setting specifies the number of consecutive successful ping/DNS lookup responses that must be received before Pepwave MAX treats a previously down WAN connection to be up again. By default, Recover Times is set to **3**. For example, a WAN connection that is treated as down will be considered to be up again upon receiving 3 consecutive successful ping/DNS lookup responses.

Automatic Public DNS Server Check on DNS Test Failure

In case the health check method is set to DNS Lookup and checks failed, the MAX will automatically perform DNS lookups on some public DNS servers. If the tests are success, it means the WAN may not be down but rather the target DNS server became malfunctioned. You will see the following warning message on the Main page.


Failed to receive DNS response from the health-check DNS servers for WAN connection 3. But public DNS server lookup test via the WAN passed. So please check the DNS server settings.

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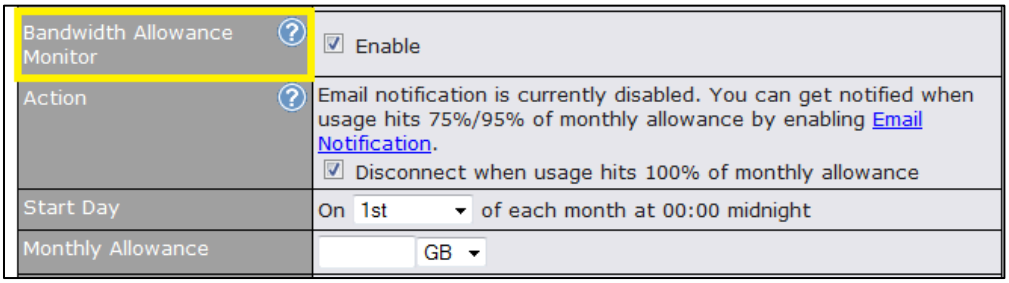
8.5 Bandwidth Allowance Monitor

Bandwidth Allowance Monitor helps keep track of your network usage.

Enable Bandwidth Allowance Monitor


Bandwidth Allowance Monitor
Enable
Action
Email notification is currently disabled. You can get notified when usage hits 75%/95% of monthly allowance by enabling Email Notification.
Disconnect when usage hits 100% of monthly allowance
Start Day
On 1st of each month at 00:00 midnight
Monthly Allowance
GB

Bandwidth Allowance Monitor	
Action	If the feature Email Notification is enabled, you will be notified through email when usage hits 75% and 95% of the monthly allowance. If the box **Disconnect when usage hits 100% of monthly allowance** is checked, this WAN connection will be disconnected automatically when the usage hits the monthly allowance. It will not resume connection unless this option has been turned off or the usage has been reset when a new billing cycle starts.
Start Day	This option allows you to define which day in the month each billing cycle begins.
Monthly Allowance	This field is for defining the maximum bandwidth usage allowed for the WAN connection each month.

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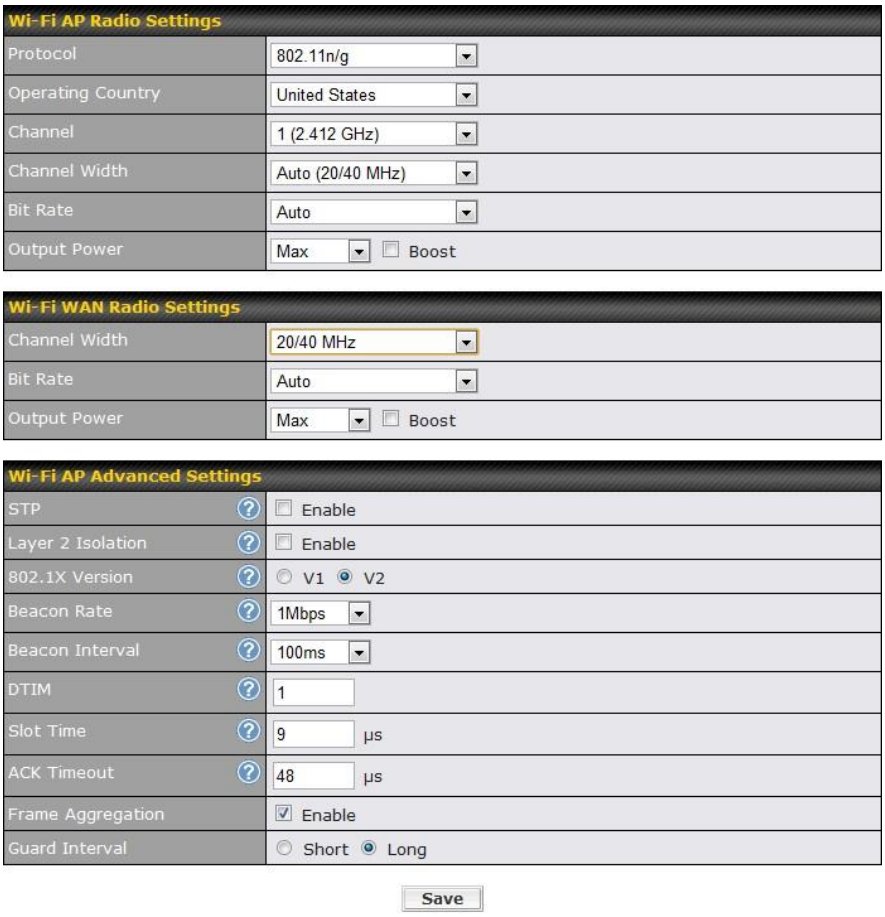
9 Wi-Fi Settings

Wi-Fi settings can be configured at ***Advanced > Wi-Fi Settings***



Wi-Fi AP Radio Settings	
Protocol	This option allows you to specify whether 802.11b and/or 802.11g client association requests will be accepted. Available options are **802.11b/g**, **802.11b Only**, and **802.11g Only**. By default, **802.11b/g** is selected.
Operating Country	This option set the country whose regulations the Pepwave MAX follows.
Channel	This option allows you to select which 802.11 RF channel will be utilized. **Channel 1 (2.412 GHz)** is selected by default.
Channel Width	Options **Auto (20/40 MHz)** and **20 MHz** are available. Default is **Auto (20/40 MHz),** which allows both widths to be used simultaneously.
Bit Rate	This option allows you to select a specific bit rate for data transfer over the device's Wi-Fi network. By default, **Auto** is selected.
Output Power	This option is for specifying the transmission output power for the Wi-Fi AP. There are 4 relative power levels available – Max, High, Mid and Low. The actual

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	output power will be bound by the regulatory limits of the selected country. By default, **23 dBm (200 mW)** or **20 dBm (100 mW)** (depending on which operating country you have chosen in the previous section) is selected.

Wi-Fi WAN Radio Settings	
Channel Width	Options **Auto (20/40 MHz)** and **20 MHz** are available. Default is **Auto (20/40 MHz),** which allows both widths to be used simultaneously.
Bit Rate	This option allows you to select a specific bit rate for data transfer over the device's Wi-Fi network. By default, **Auto** is selected.
Output Power	This option is for specifying the transmission output power for the Wi-Fi AP. There are 4 relative power levels available – Max, High, Mid and Low. The actual output power will be bound by the regulatory limits of the selected country. By default, **23 dBm (200 mW)** or **20 dBm (100 mW)** (depending on which operating country you have chosen in the previous section) is selected.

Wi-Fi AP Advanced Settings	
STP	This option allows you to enable the Spanning Tree Protocol to prevent path redundancy. By default, it is disabled. See Section **Error! Reference source not found.**9.1 for details.
Layer 2 Communication	This option allows you to choose whether clients on the network should be able to communicate with each other directly. If the checkbox **Enable** is selected, clients are allowed to communicate with each other directly, and traffic will not be passed to any uplink equipment. If this option is disabled, clients are not allowed to communicate directly. Traffic will be passed to uplink equipment/uplink routers before communication can be established among clients. By default, it is **enabled**.
802.1X Version	This option allows you to select between V1 or V2 of the 802.1X EAPOL. When **V1** is selected, both V1 and V2 clients are allowed to associate with this Wi-Fi AP. When **V2** is selected, only V2 clients can associate with this Wi-Fi AP. Most wireless clients support V2. Select the option V1 in case if there are stations that do not support V2. By default, **V2** is selected.
Beacon Rate	This option is for setting the transmit bit rate for sending a beacon. By default, **1Mbps** is selected.
Beacon Interval	This option is for setting the time interval between each beacon. By default, **100ms** is selected.
DTIM	This field allows you to set the frequency for the beacon to include Delivery Traffic Indication Message. The interval is measured in millisecond. The default value is set to **1 ms**.
Slot Time	This field is for specifying the unit wait time before it transmits a packet. By default, this field is set to **9 µs**.

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ACK Timeout	This field is for setting the wait time to receive an acknowledgement packet before performing a retransmission. By default, this field is set to **48 µs**.
Channel Bonding	There are 3 selections available in this setting. The first is 20 where the channel bonding is off and the channel width is 20 MHz. If 20/40 is selected, the AP will automatically choose the channel widths between 20 and 40 MHz. If 40 is chosen, channel bonding will be enforced and, the channel width will just be 40 MHz.
Frame Aggregation	This option allows you to enable frame aggregation to increase transmission throughput.
Guard Interval	This is where you opt for a short or long guard period interval for your transmissions.

STP Settings	
Bridge Priority	This parameter is set to give the likeliness for root switch election. By default, it is set to **32768**.
Ethernet Path Cost	This parameter specifies the preference to provide the best path from the switch to the root switch. By default, it is set to **100**.

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10 Bandwidth Bonding SpeedFusion™

Pepwave Bandwidth Bonding SpeedFusion™ functionality securely connects your MAX indifferent branch to another Pepwave MAX or Peplink device (only Peplink Balance 210/310/380/580/710/1350 are available for this function). The data, voice, or video communications between these locations are kept confidential across the public Internet.

The Bandwidth Bonding SpeedFusion™ of the Pepwave MAX is specifically designed for multi-WAN environment. The Pepwave MAX can aggregate all WAN connections' bandwidth for routing SpeedFusion™ traffic. Unless all the WAN connections of one site are down, the Pepwave MAX can still maintain VPN up and running.

VPN Bandwidth Bonding is supported in firmware 5.1 or above. All available bandwidth will be utilized to establish the VPN tunnel, and all traffic will be load balanced at packet level across all links. VPN Bandwidth Bonding is enabled by default.

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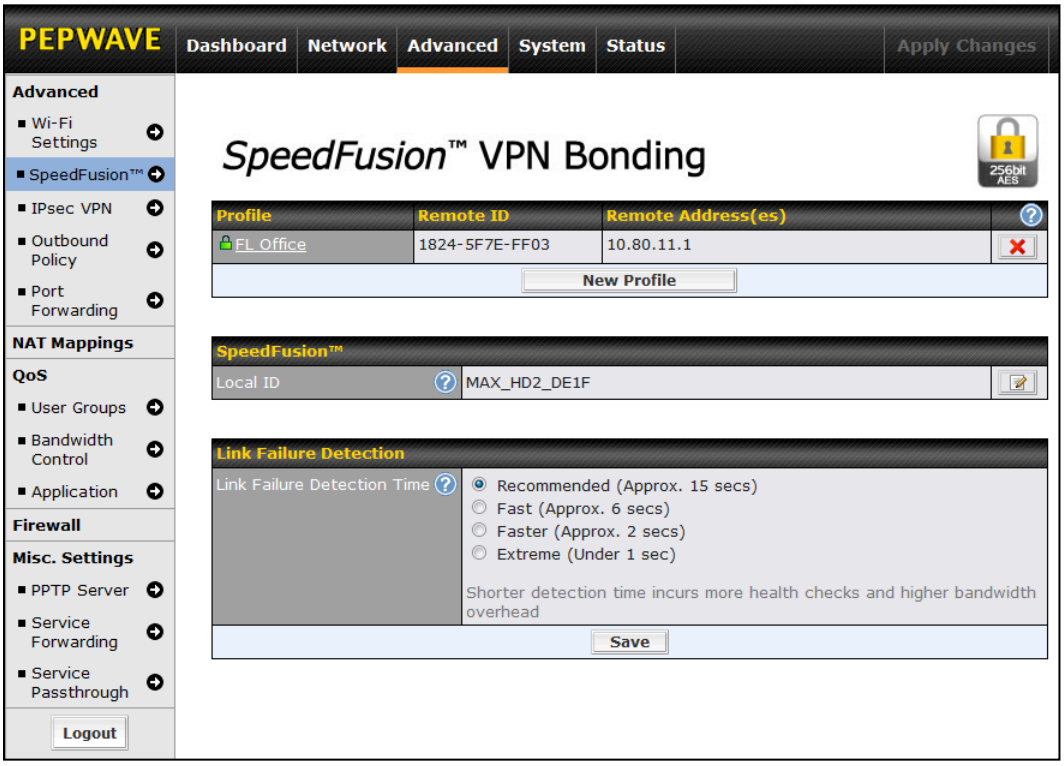
10.1 SpeedFusion™



Pepwave MAX supports making two SpeedFusion™ connections with a remote Pepwave MAX unit or a Peplink Balance 210/310/380/580/710/1350.

The local LAN subnet and subnets behind the LAN (defined under ***Static Route*** in the LAN settings page) will be advertised to the VPN. All VPN members (branch offices and headquarters) will be able to route to the local subnets.

Note that all LAN subnet and subnets behind it have to be unique. Otherwise, VPN members will not be able to access each other.

All data can be routed over the VPN with 256-bit AES encryption standard.

To configure, navigate to ***Advanced > SpeedFusion™,*** click the **New Profile** button

to create a new VPN profile.

Once you click on New Profile button this will open a window

Click on OK

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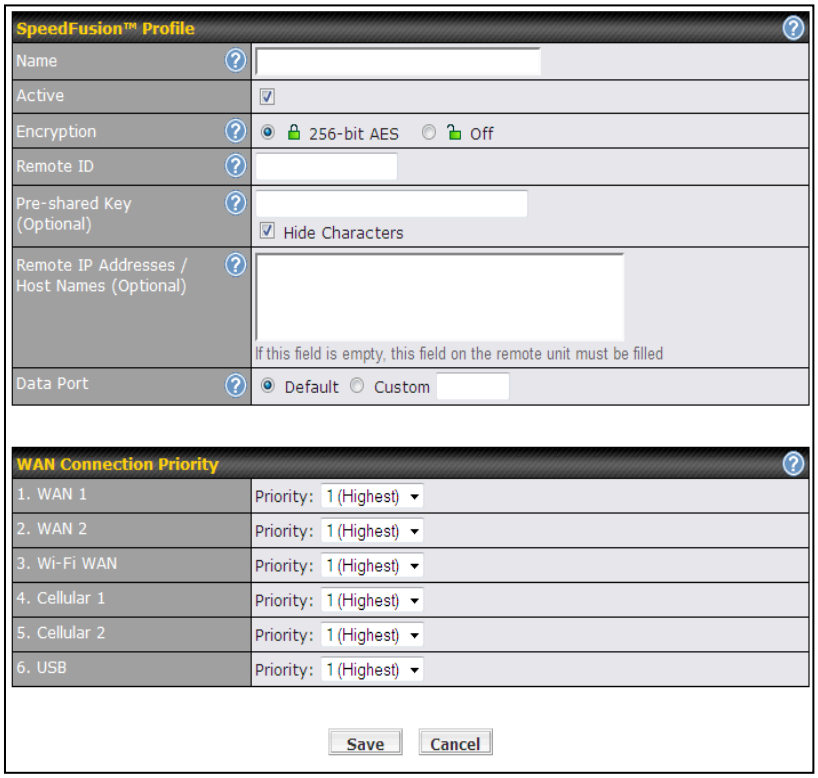

A list of defined **VPN Connection** profiles and **Link Failure Detection Time** option will be shown.

Click the **New Profile** button to create a new VPN connection profile for making VPN connection to a remote Peplink Balance/Pepwave MAX via the available WAN connections. Each profile is for making VPN connection with one remote Peplink Balance/Pepwave MAX.

You can check the status of the connection from:

Status > SpeedFusion™

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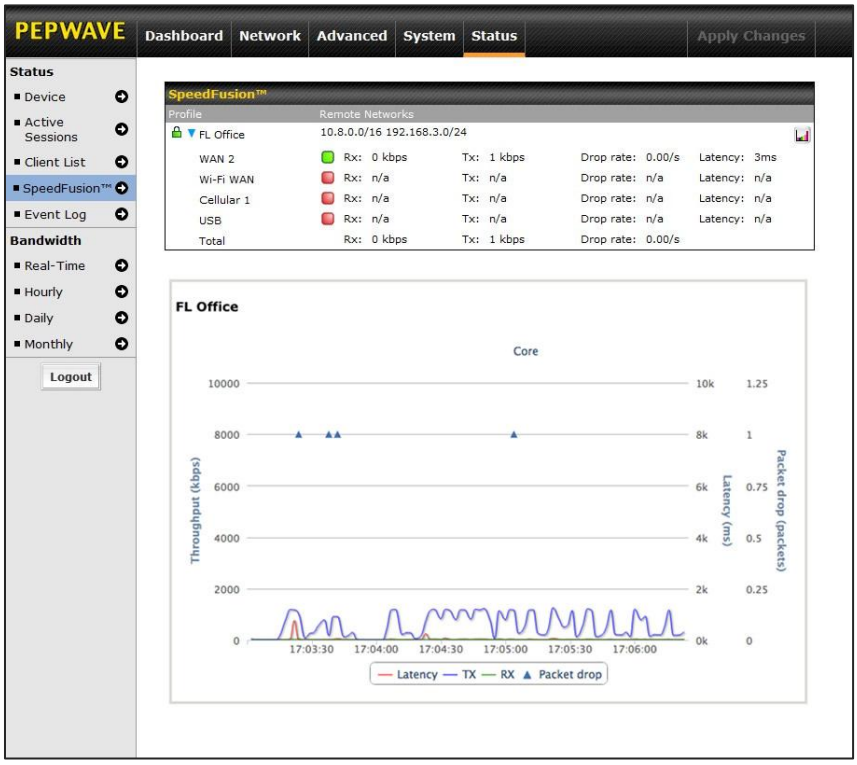

VPN Settings	
Active	Check this box to enable the VPN.
Encryption	By default, VPN traffic is encrypted with 256-bit AES standard. If the option Off is selected on both sides of a VPN connection, no encryption will be applied.
Remote ID	Pepwave MAX establishes VPN connection with a remote peer that has a serial number or a remote ID here.
Pre-shared Key	This is an optional field which defines the pre-shared key used for this particular VPN connection. The VPN connection's session key will be further protected by the factor of the pre-shared key. The connection will be up only if the pre-shared keys on each side match. When the remote peer is running firmware 5.0 or 5.1, this setting will be ignored.
Remote IP Addresses / Host Names	Enter the remote peer's WAN IP address(es) or host name(s) here. Dynamic-DNS host names are accepted. This field is optional. With this field filled, the Pepwave MAX will initiate connection to each of the remote IP addresses until success. If the field is empty, the Pepwave MAX will wait for connection from the remote peer. Therefore, at least one side of the two VPN peers has to have the field filled. Otherwise, VPN connection cannot be established. Enter one IP address or host name per line.
Data Port	If **Default** is selected, VPN data will go through UDP port 4500. Select **Custom** and enter a port number if a specific outgoing port is desired.

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Layer 2 Bridging	When this check box is unchecked, traffic between local and remote networks will be IP forwarded. To bridge the Ethernet network of an Ethernet port on a local and remote network, select this check box. When this check box is selected, the two networks will become a single LAN, and any broadcast (e.g., ARP requests) or multicast traffic (e.g., Bonjour) will be sent over the VPN. The L2 bridging feature is hidden from the user interface by default. To enable this feature, user has to click the hidden link at the upper right corner of the SpeedFusion™ Profile table.
Bridge port	This field specifies the port to be bridged to the remote site. If you choose WAN X (internal: replace the X by the WAN port number) that WAN will be disabled for WAN purposes. Instead, the WAN port will be dedicated to bridging with the remote site. The LAN port will remain unchanged.
VLAN Tagging	This field specifies the VLAN ID with which the VPN's traffic should be tagged before sending the traffic to the bridge port. If no VLAN tagging is needed, select No VLAN. To define a new VLAN ID, click New... and input the VLAN ID. VLAN IDs that are not referenced by any VPN profiles will be removed from the list automatically. Default: No VLAN
STP	Checking this box enables Spanning Tree Protocol. Default: Unchecked.
Preserve LAN Settings Upon Connected	The LAN port is chosen as the bridge port. Selecting this option preserves LAN settings (e.g., LAN port IP address, DHCP server, etc.) when the Layer 2 VPN is connected. Uncheck this option if the LAN IP address and gateway will use remote LAN settings. Check this option if the LAN IP address and local DHCP server should remain unchanged after the VPN is up. If you choose not to preserve LAN settings when the VPN is connected, the device will not act as a router, and most Layer 3 routing functions will cease to work.

WAN Connection Priority	
WAN Connection Priority	You can specify the priority of the WAN connections to be used for making VPN connections. WAN connections set to **OFF** will never be used. Only available WAN connections with the highest priority will be utilized.

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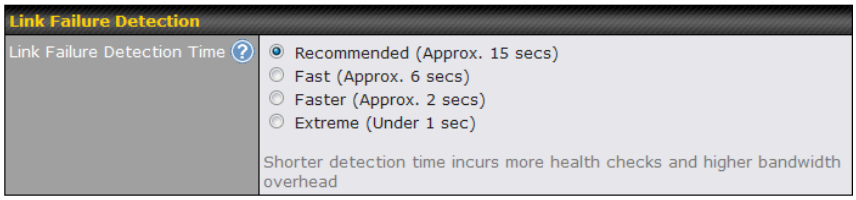
10.2 Link Failure Detection


Link Failure Detection
Link Failure Detection Time
Recommended (Approx. 15 secs)
Fast (Approx. 6 secs)
Faster (Approx. 2 secs)
Extreme (Under 1 sec)
Shorter detection time incurs more health checks and higher bandwidth overhead

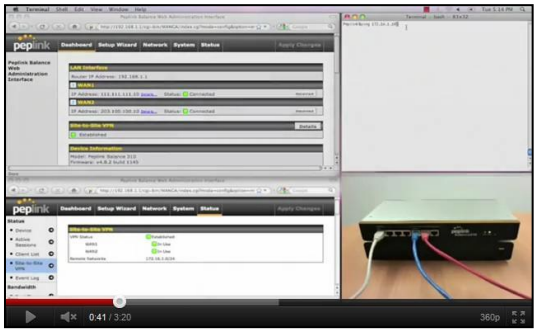
Link Failure Detection	
Link Failure Detection Time	The bonded SpeedFusion™ can detect routing failures on the path between two sites over each WAN connection. Failed WAN connections will not be used to route VPN traffic. Health check packets are sent to the remote unit to detect any failure. The more frequent checks it sends, the shorter detection time, but the higher bandwidth overhead will be consumed. When **Recommended** is selected, a health check packet is sent out every 5 seconds, and the expected detection time is 15 seconds. When **Fast** is selected, a health check packet is sent out every 3 seconds, and the expected detection time is 6 seconds. When **Faster** is selected, a health check packet is sent out every 1 second, and the expected detection time is 2 seconds. When **Extreme** is selected, a health check packet is sent out every 0.1 second, and the expected detection time is under 1 second. By default, **Recommended** is selected.

Important Note

Pepwave proprietary SpeedFusion™ used TCP port 32015 and UDP port 4500 for establishing VPN connections. If you have a firewall in front of the devices, you will need to add firewall rules for these port and protocols which will allow inbound and outbound traffic pass-through the firewall.

Tip

Want to know more about VPN Sub-Second Session Failover? Visit our YouTube Channel for a video tutorial!



http://youtu.be/TLQgdpPSY88

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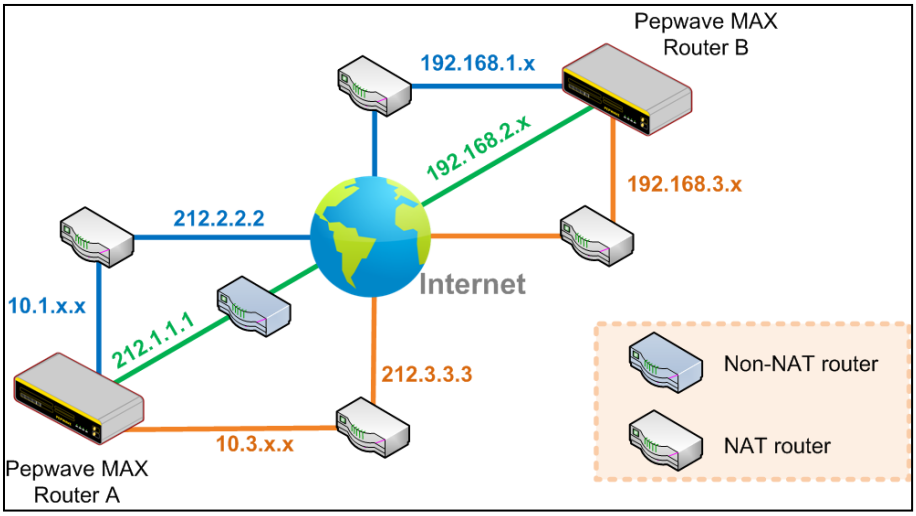
10.3 Pepwave MAX Behind NAT Router

The Pepwave MAX supports establishing SpeedFusion™ over WAN connections which are behind a NAT (Network Address Translation) router.

To be able for a WAN connection behind a NAT router to accept VPN connections, you can configure the NAT router in front of the WAN connection to forward TCP port 32015 to it.

If one or more WAN connections on **Unit A** can accept VPN connections (by means of port forwarding or not) while none of the WAN connections on the peer **Unit B** can do so, you should put all public IP addresses or host names of the **Unit A** to the **Unit B**'s **Remote IP Addresses / Host Names** field. Leave the field in **Unit A** blank. With such setting, SpeedFusion™ connection can be set up and all WAN connections on both sides will be utilized.

For example, see the following diagram:



One of the WANs of Router A is non-NAT'd (*212.1.1.1*). The rest of the WANs on Router A and all WANs on Router B are NAT'd. In such case, the **Remote IP Addresses / Host Names** field in Router B should be filled with all of the Router A's host names or public IP addresses (i.e. *212.1.1.1, 212.2.2.2* and *212.3.3.3*), and the field in Router A can be left blank. The two NAT routers on WAN1 and WAN3 of Router A should inbound port forward TCP port 32015 to the Router A so that all WANs would be utilized to establish VPN.

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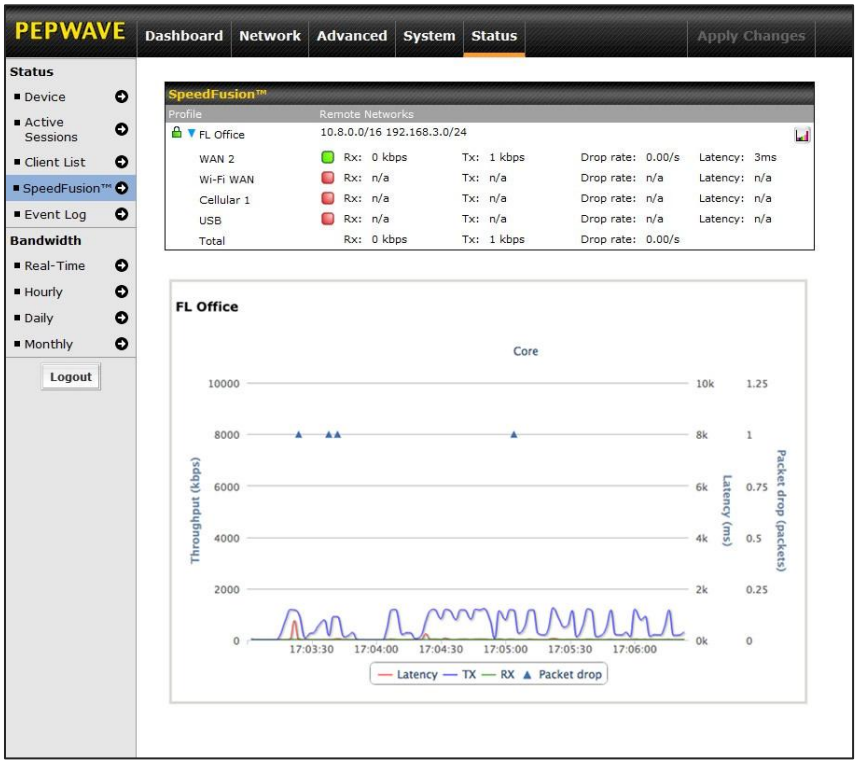
10.4 SpeedFusion™ Status

VPN Status is shown in the ***Status > SpeedFusion™***. The connection status of each connection profile is shown as below:



By clicking the **Details** button at the top-right hand corner of SpeedFusion™ table, you will be forwarded to ***Status > SpeedFusion™.*** You can view the subnet and WAN connection information of each VPN peer. Please refer to Section 19.5 for details.

IP subnets must be unique among VPN peers

The entire inter-connected SpeedFusion™ network is one single non-NAT IP network. No two subnets in two sites shall be duplicated. Otherwise, connectivity problems will be experienced in accessing those subnets.

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11 IPsec VPN

Pepwave MAX IPsec VPN functionality securely connects one or more branch offices to your company's main headquarters or to other branches. The data, voice, or video communications between these locations are thus kept safe and confidential across the public Internet.

The IPsec VPN of the Pepwave MAX is especially designed for a multi-WAN environment. For instance, a user sets up multiple IPsec profiles for his multi- WAN1 ~ WAN3 environment, if WAN1 is connected and its health check turns up good, the IPsec traffic will go through this link. However, should unforeseen problems (e.g. physically unplugged or ISP problems) arise and cause WAN1 to go down, our IPsec implementation will make use of WAN2 and WAN3 accordingly, as failover purposes.

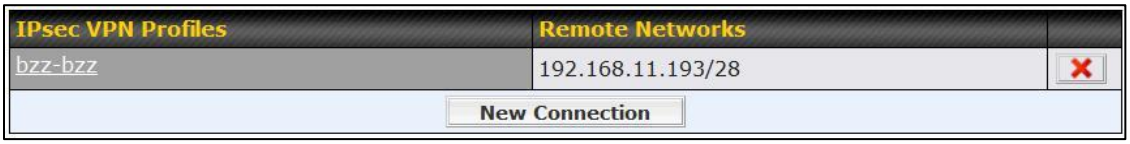
11.1 IPsec VPN Settings

All of our Pepwave products can make multiple IPsec VPN connections with Peplink, Pepwave as well as Cisco or Juniper Routers.

Note that all LAN subnet and subnets behind it have to be unique. Otherwise, VPN members will not be able to access each other.

All data can be routed over the VPN with a selection of encryption standards such as 3DES, AES-128 and AES-256.

To configure, navigate to ***Advanced > IPsec VPN:***



A **NAT-Traversal** option and list of defined **IPsec VPN** profiles will be shown.

The NAT-Traversal option should be enabled if your system is behind a NAT router.

Click the **New Connection** button

to create new IPsec VPN profiles that make VPN connections to remote Peplink Balance, Pepwave MAX, Cisco or Juniper Routers via the available WAN connections. To edit any of the profiles, click on its associated connection name in the leftmost column.

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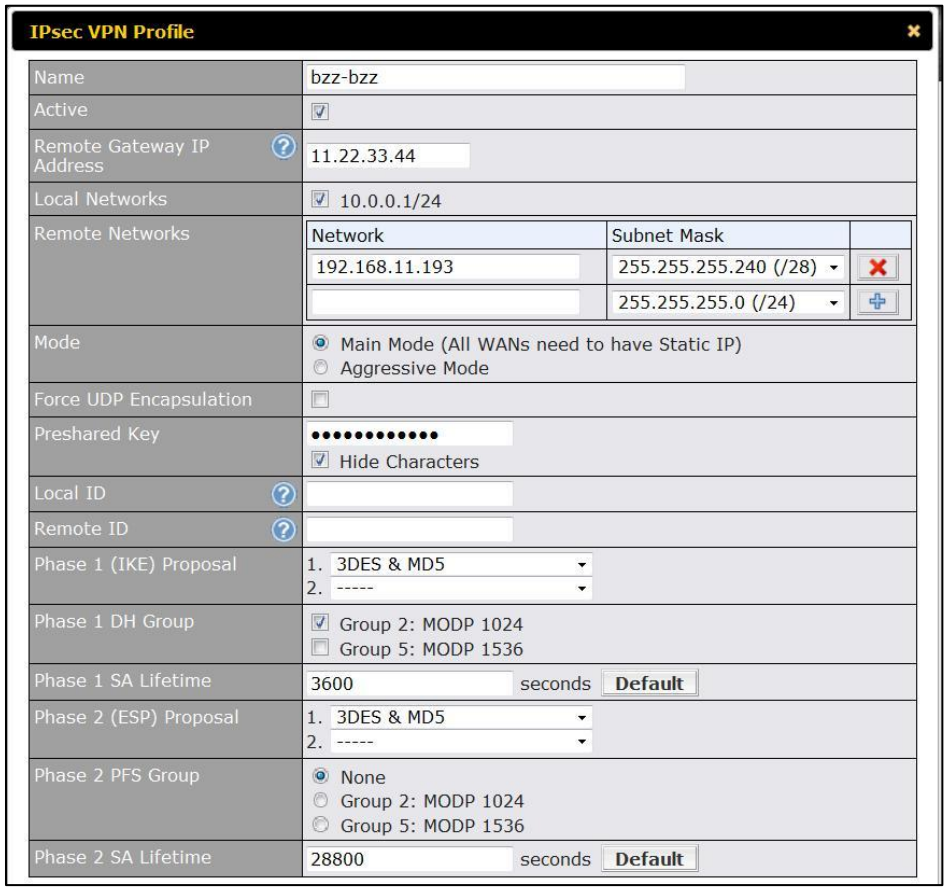

IPsec VPN Settings	
Name	This field is for specifying a local name to represent this connection profile.
Active	When this box is checked, this IPsec VPN connection profile will be enabled. Otherwise, it will be disabled.
Remote Gateway IP Address	Enter the remote peer's public IP address. For Aggressive Mode, this is optional..
Local Networks	Enter the local LAN subnets here. If you have defined "static routes", they will be shown here too.
Remote Networks	Enter the LAN and subnets that are located at the remote site here.
Main Mode	Choose this Main Mode if both IPsec peers use static IP addresses.
Aggressive Mode	Choose this Aggressive Mode if one of the IPsec peers use dynamic IP addresses.
Force UDP Encapsulation	For UDP encapsulation to be forced regardless of the NAT-Traversal, tick this checkbox.
Pre-shared Key	This defines the peer authentication pre-shared key to be used to authenticate this VPN connection. The connection will be up only if the pre-shared keys on each side match.

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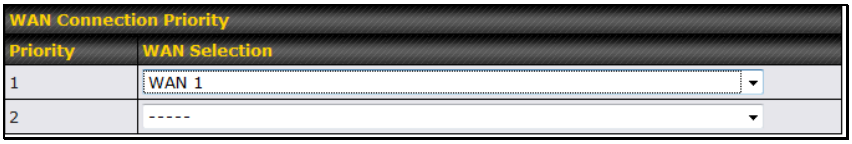
Local ID	Under Main Mode, this field can be left blank. Under Aggressive Mode, if Remote Gateway IP Address field is filled on this end and the peer end, this field can be left blank. Otherwise, this field is typically a U-FQDN.
Remote ID	Under Main Mode, this field can be left blank. Under Aggressive Mode, if Remote Gateway IP Address field is filled on this end and the peer end, this field can be left blank. Otherwise, this field is typically a U-FQDN.
Phase 1 (IKE) Proposal	Under Main Mode, this allows the setting of up to 6 encryption standards, in descending order of priority, to be used in the initial connection key negotiations. For Aggressive Mode, only one selection is permitted.
Phase 1 DH Group	This is the Diffie-Hellman group used within IKE. This allows two parties to establish a shared secret over an insecure communications channel. The larger the group number, the higher the security. Group 2 - 1024-bit is the default value. Group 5 - 1536-bit is the alternative option.
Phase 1 SA Lifetime	This setting specifies the lifetime limit of this Phase 1 Security Association. By default, it is set at 3600 seconds.
Phase 2 (ESP) Proposal	Under Main Mode, this allows the setting of up to 6 encryption standards, in descending order of priority, to be used for the IP data that is being transferred. For Aggressive Mode, only one selection is permitted.
Phase 2 PFS Group	The Perfect Forward Secrecy (PFS) ensures that if a key was compromised, the attacker will be able to access only the data protected by that key but not any other data. None - Do not request for PFS when initiating connection. However, since there is no valid reason to refuse PFS, the system will allow the connection to use PFS if requested by the remote peer. This is the default value. Group 2 - 1024-bit Diffie-Hellman group. The larger the group number, the higher the security. Group 5 - 1536-bit is the third option.
Phase 2 SA Lifetime	This setting specifies the lifetime limit of this Phase 2 Security Association. By default, it is set at 28800 seconds.

WAN Connection Priority	
WAN Connection	Select the appropriate WAN connection with the help of drop down



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11.2 IPsec Status

IPsec Status shows the current connection status of each connection profile and is displayed in ***Status > IPsec.***

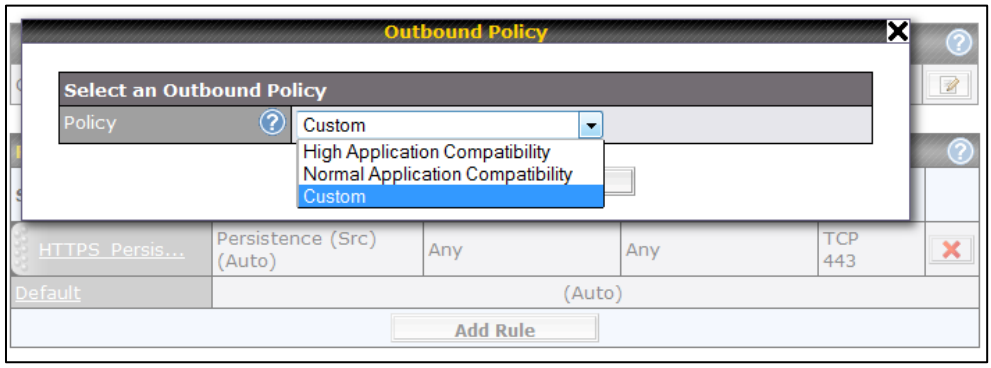
12 Management of Outbound Traffic to WAN

Pepwave MAX provides the functionality to flexibly manage and load balance outbound traffic among the WAN connections.

Important Note
Outbound Policy is applied only when more than one WAN connection is active.

The settings for managing and load balancing outbound traffic are located in ***Advanced > Outbound Policy***:

Network > Outbound Policy > Click on



12.1 Outbound Policy

There are three main selections for the Outbound Policy for Pepwave MAX:

- High Application Compatibility
- Normal Application Compatibility
- Custom

The selections are explained as follows:

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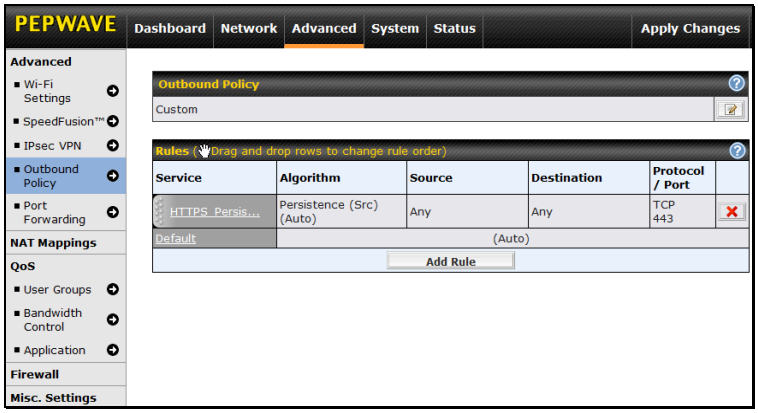
Outbound Policy Settings	
High Application Compatibility	With the selection of this policy, outbound traffic from a source LAN device is routed through the same WAN connection regardless of the destination Internet IP address and protocol. This provides the highest application compatibility.
Normal Application Compatibility	With the selection of this policy, outbound traffic from a source LAN device to the same destination Internet IP address will persistently be routed through the same WAN connection regardless of protocol. This provides high compatibility to most applications, and users still benefit from WAN link load balancing when multiple Internet servers are accessed.
Custom	With the selection of this policy, outbound traffic behavior can be managed by defining custom rules. Rules can be defined in a custom rule table. A default rule can be defined for connections that cannot be matched with any one of the rules.

The default policy is **Normal Application Compatibility**.

Tip

Want to know more about how-to create outbound rules? Visit our YouTube Channel for a video tutorial!



http://youtu.be/rKH4AS_bQnE

12.2 Custom Rules For Outbound Policy

Click in the Outbound Policy form. Choose **Managed by Custom Rules** and press the **Save** button. The following screen will then be displayed.

The bottom-most rule is **Default**. Edit this rule to change the device's default way to control outbound traffic for all connections that does not match any rules above it. Click on the service name **Default** to change its settings.

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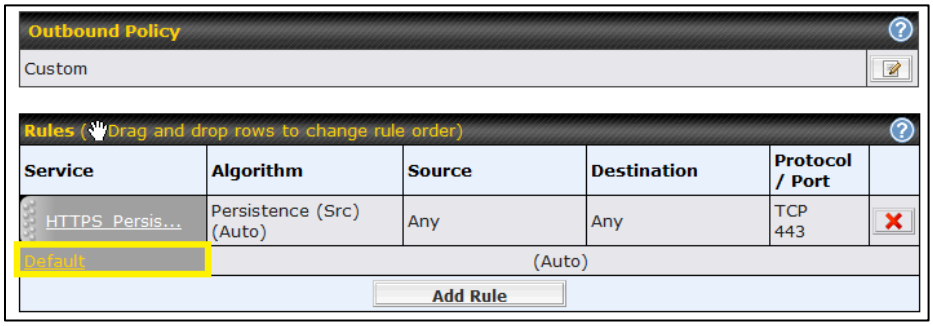

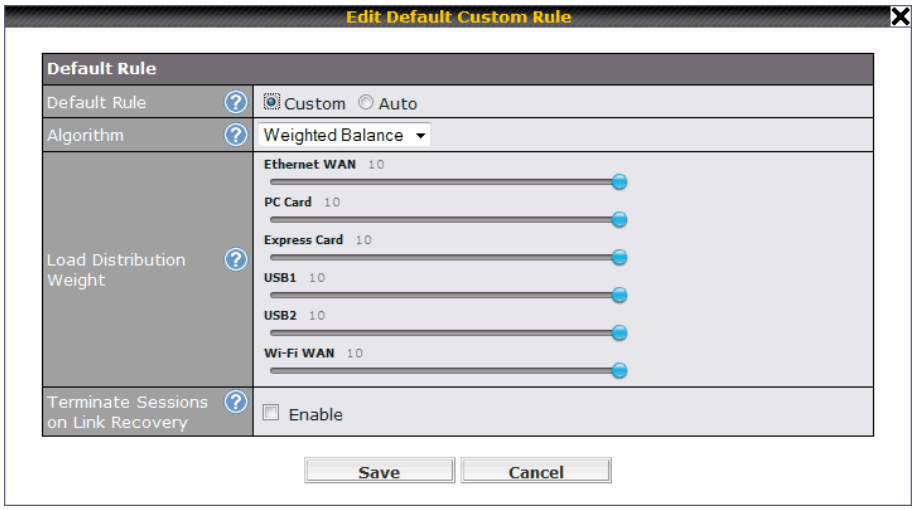

You may drag and drop a row to rearrange the priority of outbound rules.

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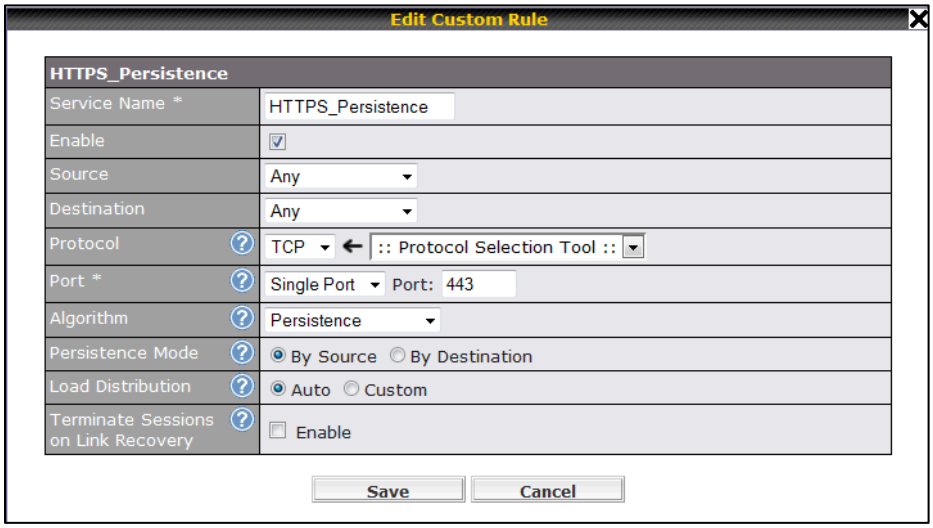
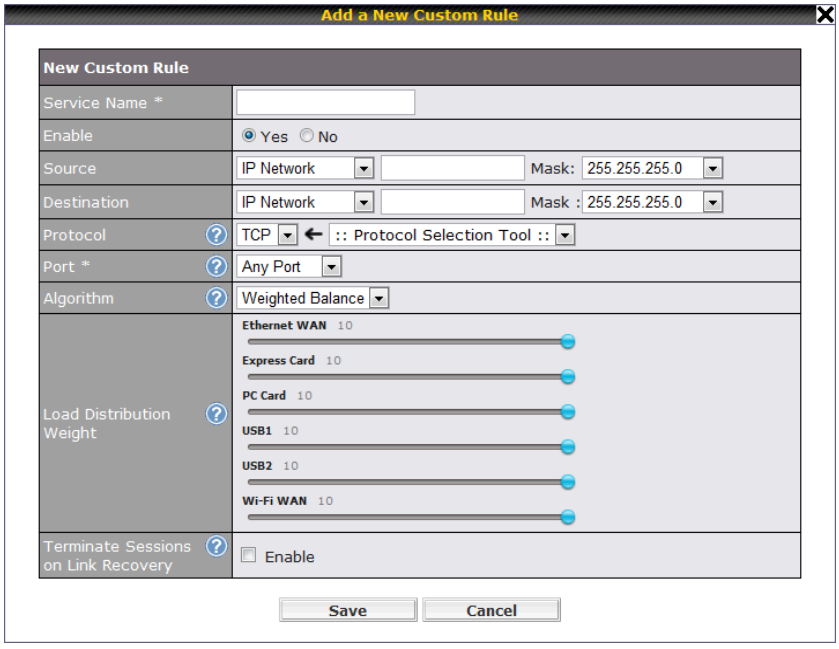


By default, **Auto** is selected for the option **Default Rule**. You can select **Custom** in order to change the Algorithm to be used. Please refer to the upcoming sections for the details of the available algorithms.

To create a custom rule, click **Add Rule**

at the bottom of the table, and the following window will be displayed:



If Domain Name is chosen and a domain name, such as foobar.com, is entered, any outgoing accesses to foobar.com and `*.foobar.com` will match this criterion. You may enter a wildcard (.*) at the end of a domain name to match any host with a name having the domain name in the middle. If you enter `foobar.*`, for example, then www.foobar.com, www.foobar.co.jp, or foobar.co.uk will also match. Placing wildcards in any other position is not supported.

NOTE: If a server has one Internet IP address and multiple server names, and if one of the names is defined here, then accesses to any one of the server names will also match this rule.

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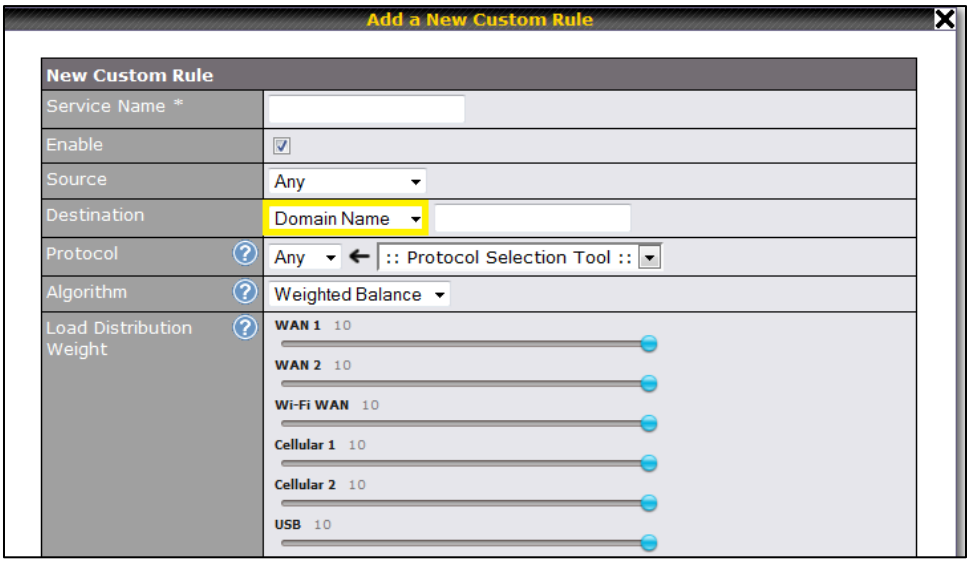
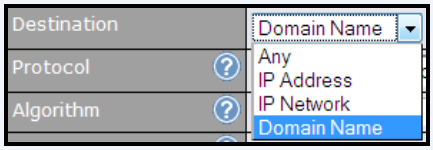


New Custom Rule Settings	
Service Name	This setting specifies the name of the custom rule.
Enable	This setting specifies whether the outbound traffic rule takes effect. With an Enable value of **Yes**, the rule takes effect: traffic is matched, and actions are taken, by Pepwave MAX based on the other parameters of the rule. With an Enable value of **No**, the rule does not take effect Pepwave MAX disregards the other parameters of the rule.
Source	This setting specifies the source IP Address, IP Network or MAC Address for outbound traffic that matches the rule.
Destination	This setting specifies the destination IP Address or IP Network or Domain Name for traffic that matches the rule. 
Domain Name	If Domain Name is chosen and a domain name, such as foobar.com, is entered, any outgoing accesses to foobar.com and `*.foobar.com` will match this criterion. You may enter a wildcard (.*) at the end of a domain name to match any host with a name having the domain name in the middle. If you enter `.*`, for example, then www.foobar.com, www.foobar.co.jp, or foobar.co.uk will also match. Placing wildcards in any other position is not supported. NOTE: if a server has one Internet IP address and multiple server names, and if one of the names is defined here, then accesses to any one of the server names will also match this rule.
Protocol and Port	This setting specifies the IP Protocol and Port of outbound traffic that matches this rule. You may select some common protocol from the **Protocol Selection Tool** drop-down menu.

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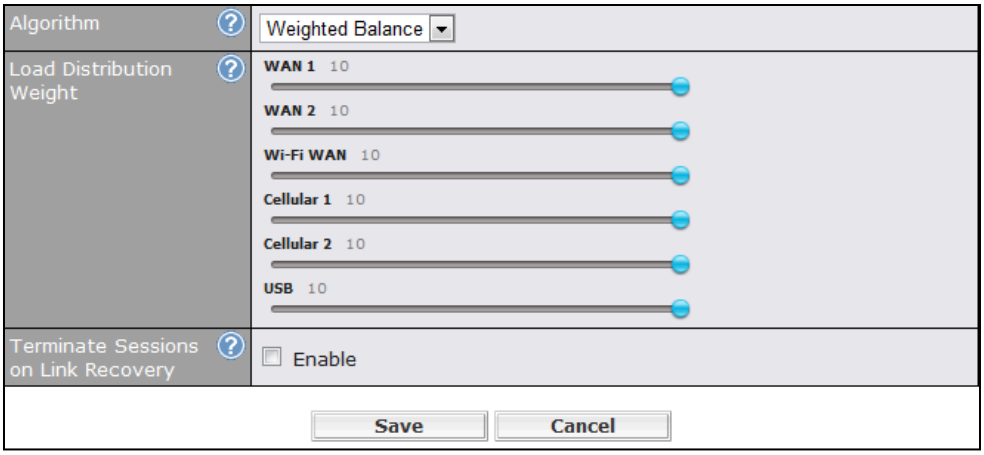
Algorithm	This setting specifies the behavior of Pepwave MAX for the custom rule. One of the following values can be selected: • Weighted Balance • Persistence • Enforced • Priority • Overflow • Least Used • Lowest Latency The upcoming sections present the details of the listed algorithms.
Terminate Sessions on Link Recovery	This setting specifies whether to terminate existing IP sessions on a less preferred WAN connection in the event that a more preferred WAN connection is recovered. This setting is applicable to the Algorithms: **Weighted**, **Persistence** and **Priority**. By default, this is disabled. In this case, all existing IP sessions will not be terminated or affected when any other WAN connection is recovered. If it is set to enabled, existing IP sessions may be terminated when another WAN connection is recovered such that only the preferred healthy WAN connection(s) are used at any point in time.

12.2.1 Algorithm: Weighted Balance

This setting specifies the ratio of WAN connection usage to be applied on the specified IP Protocol & Port, and is applicable only when Algorithm is set to **Weighted Balance**.



The amount of matching traffic that is distributed to a WAN connection is proportional to the weight of the WAN connection relative to the total weight. Use the sliders to change the weight for each WAN.

Example: With the following weight settings:

- Ethernet WAN1: 10
- Ethernet WAN2: 10
- Wi-Fi WAN: 10
- Cellular 1: 10
- Cellular 2: 10
- USB: 10

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Total weight is 60 = (10 + 10 + 10 + 10 + 10 + 10)

Matching traffic distributed to Ethernet WAN1 is 16.7% = (10 / 60 x 100%

Matching traffic distributed to Ethernet WAN2 is 16.7% = (10 / 60) x 100%

Matching traffic distributed to Wi-Fi WAN is 16.7% = (10 / 60) x 100%

Matching traffic distributed to Cellular 1 is 16.7% = (10 / 60) x 100%

Matching traffic distributed to Cellular 2 is 16.7% = (10 / 60) x 100%

Matching traffic distributed to USB is 16.7% = (10 / 60) x 100%

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12.2.2 Algorithm: Persistence

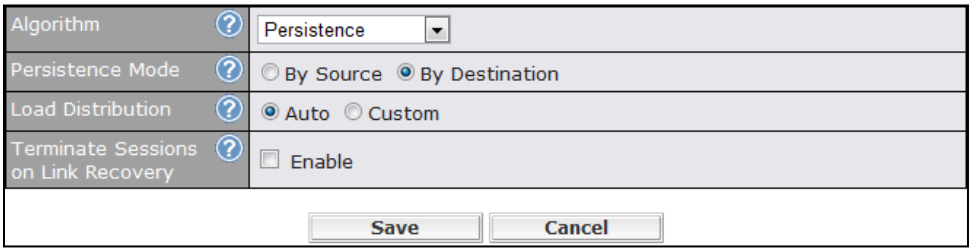
The configuration of using Persistence for algorithm is the solution to the few situations where link load distribution for Internet services is undesirable.

For example, many e-banking and other secure websites, for security reasons, terminate the session when the client computer's Internet IP address changes during the session.

In general, different Internet IP addresses represent different computers. The security concern is that an IP address change during a session may be the result of an unauthorized intrusion attempt. Therefore, to prevent damages from the potential intrusion, the session is terminated upon the detection of an IP address change.

Pepwave MAX can be configured to distribute data traffic across multiple WAN connections. Also, the Internet IP depends on the WAN connections over which communication actually takes place. As a result, a LAN client computer behind Pepwave MAX may communicate using multiple Internet IP addresses. For example, a LAN client computer behind a Pepwave MAX with three WAN connections may communicate on the Internet using three different IP addresses.

With the algorithm Persistence of Pepwave MAX, rules can be configured to enable client computers to persistently utilize the same WAN connections for e-banking and other secure websites. As a result, a client computer will communicate with the other end using one IP address and eliminate the issues.



There are two modes for Persistence: **By Source** and **By Destination**.

By Source	The same WAN connection will be used for traffic matching the rule and originating from the same machine regardless of its destination. This option will provide the highest level of application compatibility.
By Destination	The same WAN connection will be used for traffic matching the rule, originating from the same machine, and going to the same destination. This option can better distribute load to WAN connections when there are only a few client machines.

The default mode is **By Source**.

When there are multiple client requests, they can be distributed (persistently) to WAN connections with a weight. If you choose **Auto** for **Load Distribution**, the weights will be automatically adjusted according to each WAN's Downstream Bandwidth which is specified in the WAN settings page (see Section 8 Configuration of WAN Interface(s)). If you choose **Custom**, you can customize the weight of each WAN manually by using the sliders.

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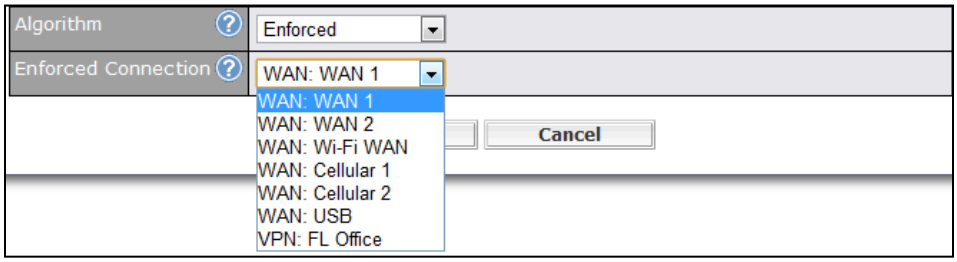
12.2.3 Algorithm: Enforced

This setting specifies the WAN connection usage to be applied on the specified IP Protocol & Port, and is applicable only when the Algorithm is set to **Enforced**.

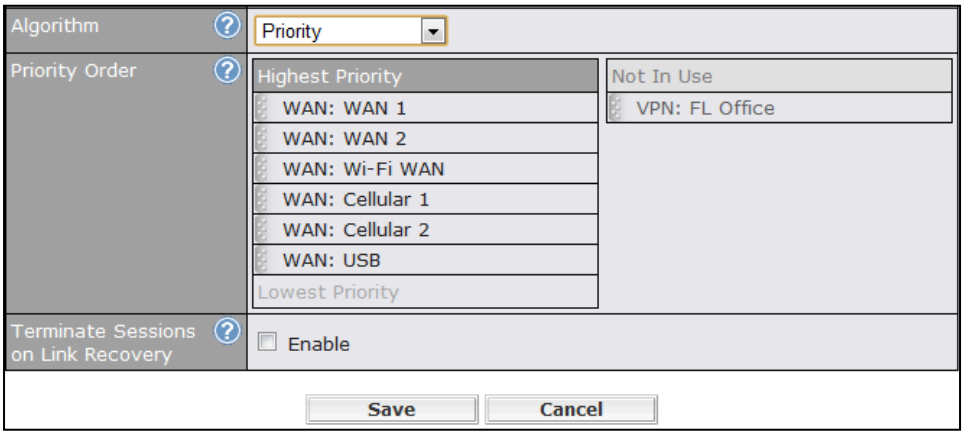


Matching traffic will be routed through the specified WAN connection regardless of the connection's health check status.

Starting from firmware 5.2, outbound traffic can be enforced to go through a specified SpeedFusion™ connection.

12.2.4 Algorithm: Priority

This setting specifies the priority of the WAN connections to be utilized to route the specified network service. The highest priority WAN connection available will always be used for routing the specified type of traffic. A lower priority WAN connection will be used only when all higher priority connections have become unavailable.



Starting from firmware 5.2, outbound traffic can be prioritized to go through SpeedFusion™ connection(s). By default, VPN connections are not included in the priority list.

Tip
Configure multiple distribution rules to accommodate different kinds of services.

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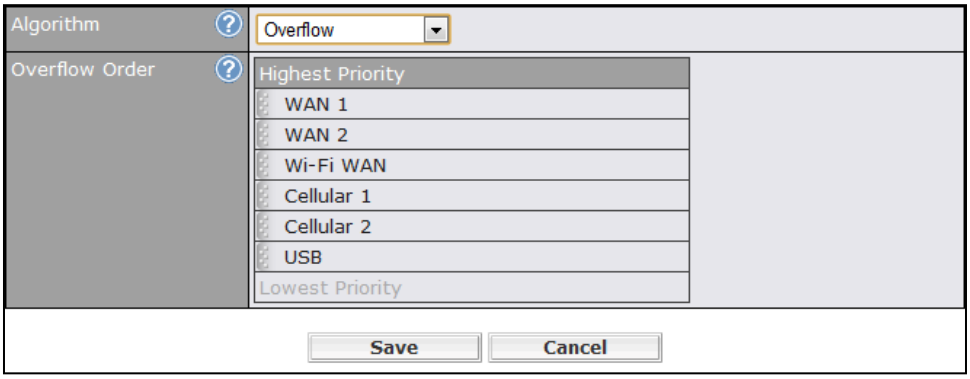
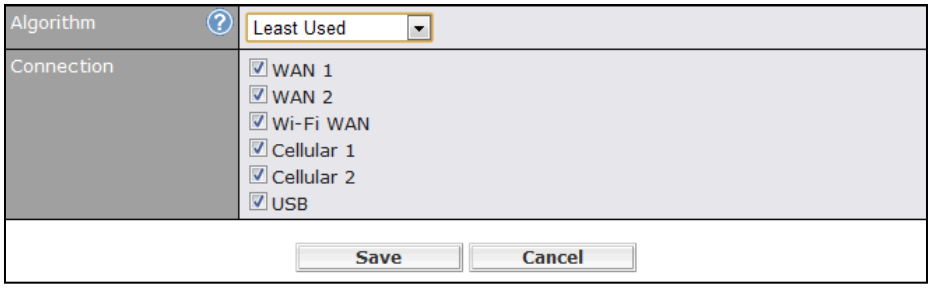
12.2.5 Algorithm: Overflow

The traffic matching this rule will be routed through the healthy WAN connection that has the highest priority and is not in full load. When this connection gets saturated, new sessions will be routed to the next healthy WAN connection that is not in full load.



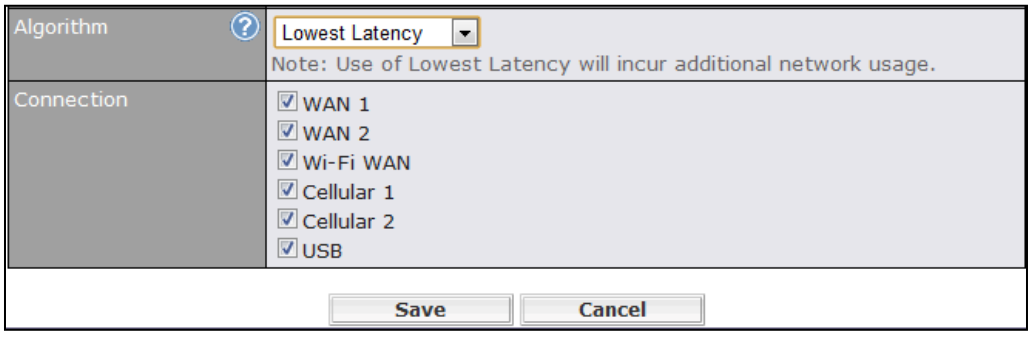
Drag and drop to specify the order of WAN connections to be used for routing traffic. Only the highest priority healthy connection that is not in full load will be utilized.

12.2.6 Algorithm: Least Used



The traffic matching this rule will be routed through the healthy WAN connection that is selected in the field **Connection** and has the most available downstream bandwidth. The available downstream bandwidth of a WAN connection is calculated from the total downstream bandwidth specified in the WAN settings page and the current downstream usage. The available bandwidth and WAN selection is determined every time when an IP session is made.

12.2.7 Algorithm: Lowest Latency



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The traffic matching this rule will be routed through the healthy WAN connection that is selected in the field *Connection* and has the lowest latency. Latency checking packets are issued periodically to a nearby router of each WAN connection to determine its latency value. The latency of a WAN is the packet round trip time of the WAN connection. Additional network usage may be incurred as a result.

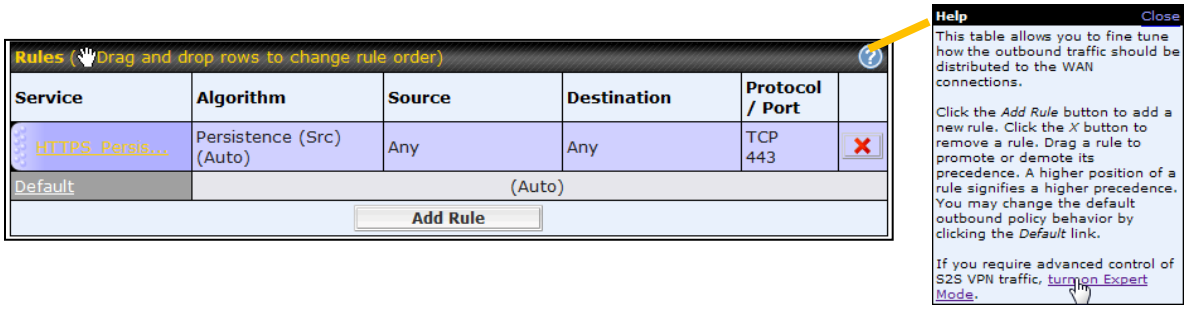
Tip
The round trip time of a “6M down / 640k up” link can be higher than that of a “2M down / 2M up” link. It is because the overall round trip time is lengthened by its lower upstream bandwidth despite of its higher downlink speed. Therefore this algorithm is good for two scenarios: - All WAN connections are symmetric; or - A latency sensitive application requires to be routed through the lowest latency WAN regardless the WAN’s available bandwidth.

12.2.8 Expert Mode

Expert Mode is also available for advance users. Click the help test balloon and click the link turn on Expert Mode to switch on the feature.

Under Expert Mode, a special rule - "SpeedFusion™ Routes" is displayed on the Custom Rules table. It represents all SpeedFusion™ routes learned from remote VPN peers. By default, this bar is on the top of all custom rules. That means traffic for remote VPN subnets will be routed to its corresponding VPN peer. You can create custom Priority or Enforced rules and move them above the bar to override the SpeedFusion™ Routes.

Upon disabling the Expert Mode, all rules above the bar will be deleted.


Rules (Drag and drop rows to change rule order)
Service
Algorithm
Source
Destination
Protocol / Port
HTTPS_Persis...
Persistence (Src) (Auto)
Any
Any
TCP 443
Default
(Auto)
Add Rule
Help
Close
This table allows you to fine tune how the outbound traffic should be distributed to the WAN connections.
Click the Add Rule button to add a new rule. Click the X button to remove a rule. Drag a rule to promote or demote its precedence. A higher position of a rule signifies a higher precedence. You may change the default outbound policy behavior by clicking the Default link.
If you require advanced control of S2S VPN traffic, turn on Expert Mode.

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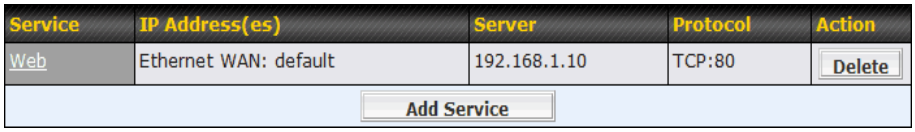
13 Port Forwarding

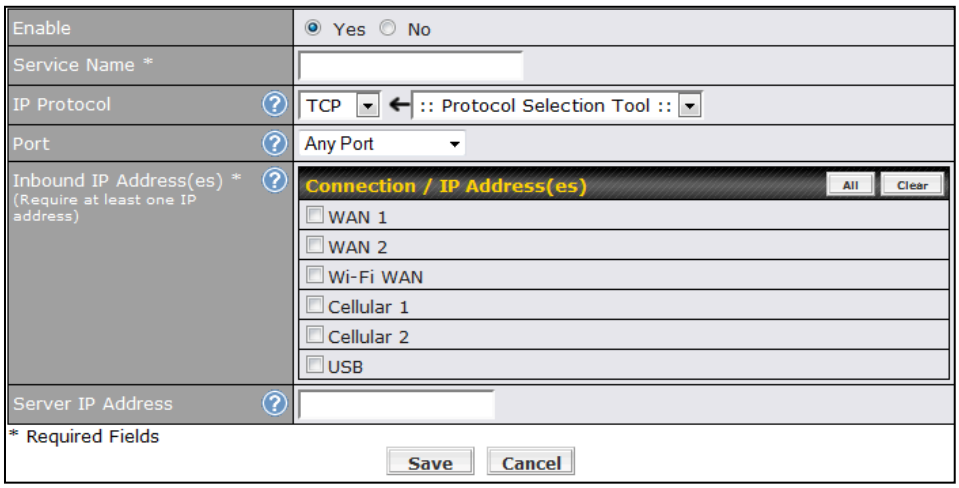
13.1 Port Forwarding Service

Pepwave MAX can act as a firewall that blocks, by default, all inbound access from the Internet. By using **Port Forwarding**, Internet users can access the servers behind Pepwave MAX.

Inbound Port Forwarding rules can be defined at ***Advanced > Port Forwarding***:



To define a new service, click the **Add Service** button, upon which the following appears:



Port Forwarding Settings	
Enable	This setting specifies whether the inbound service rule takes effect. When **Yes** is selected, the inbound service rule takes effect. If the inbound traffic matches the specified IP Protocol and Port, action will be taken by Pepwave MAX based on the other parameters of the rule. When **No** is selected, the inbound service rule does not take effect. Pepwave MAX will disregard the other parameters of the rule.
Service Name	This setting identifies the service to the System Administrator. Valid values for this setting consist only of alphanumeric and the underscore "_" characters.
IP Protocol	The IP Protocol setting, along with the Port setting, specifies the protocol of the service as TCP, UDP, ICMP or IP. Traffic that is received by Pepwave MAX via the specified protocol at the specified port(s) is forwarded to the LAN hosts specified by the Servers setting. (Please see below for details on the Port and Servers settings.) Alternatively, the **Protocol Selection Tool** drop-down menu can be used to automatically fill in the Protocol and a single Port number of common Internet services (e.g. HTTP,

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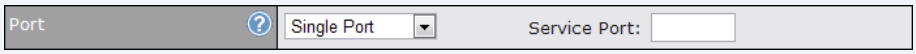
	HTTPS, etc.). After selecting an item from the Protocol Selection Tool drop-down menu, the Protocol and Port number remains manually modifiable.
Port	The Port setting specifies the port(s) that correspond to the service, and can be configured to behave in one of the following manners: **Any Port, Single Port, Port Range and Port Map** Any Port: All traffic that is received by Pepwave MAX via the specified protocol is forwarded to the servers specified by the Servers setting. For example, with IP Protocol set to TCP, and Port set to Any Port, all TCP traffic is forwarded to the configured servers.  **Single Port**: Traffic that is received by Pepwave MAX via the specified protocol at the specified port is forwarded via the same port to the servers specified by the Servers setting. For example, with IP Protocol set to **TCP**, and Port set to **Single Port** and **Service Port 80**, TCP traffic received on Port 80 is forwarded to the configured servers via Port 80. **Port Range**: Traffic that is received by Pepwave MAX via the specified protocol at the specified port range is forwarded via the same respective ports to the LAN hosts specified by the Servers setting. For example, with IP Protocol set to **TCP**, and Port set to **Single Port** and **Service Port 80-88**, TCP traffic received on ports 80 through 88 is forwarded to the configured servers via the respective ports. **Port Mapping**: Traffic that is received by Pepwave MAX via the specified protocol at the specified port is forwarded via a different port to the servers specified by the Servers setting. For example, with IP Protocol set to **TCP**, and Port set to **Port Map**, **Service Port 80**, and **Map to Port 88**, TCP traffic on Port 80 is forwarded to the configured servers via Port 88. (Please see below for details on the Servers setting.) **Range Mapping**: traffic that is received by Pepwave MAX via the specified protocol at the specified port range is forwarded via a different port to the servers specified by the Servers setting.
Inbound IP Address(es)	This setting specifies the WAN connections and Internet IP address(es) from which the service can be accessed. It is required to select at least one IP address.
Server IP Address	This setting specifies the LAN IP address of the server that handles the requests for the service.

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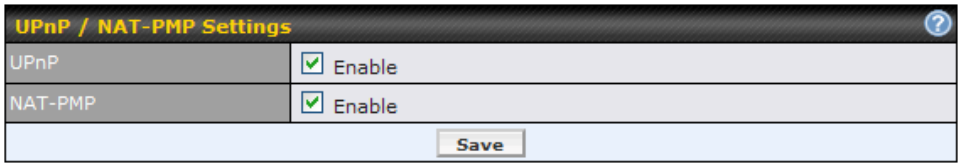
13.2 UPnP / NAT-PMP Settings

UPnP and NAT-PMP are network protocols which allow a computer on the LAN to automatically configure the router to allow parties on the WAN to connect to itself. In this way, the process of inbound port forwarding is automated.

When a computer creates a rule using these protocols, the specified TCP/UDP port of all WAN connections' default IP address will be forwarded.

Check the corresponding box(es) to enable UPnP and/or NAT-PMP. Enable these features only if you trust the computers on the LAN.



A table listing all the forwarded ports under these two protocols can be found at ***Status > UPnP / NAT-PMP***.

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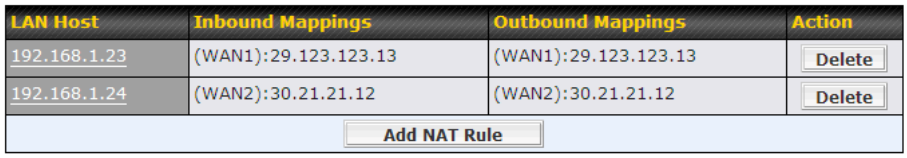
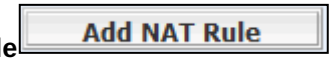
14 NAT Mappings

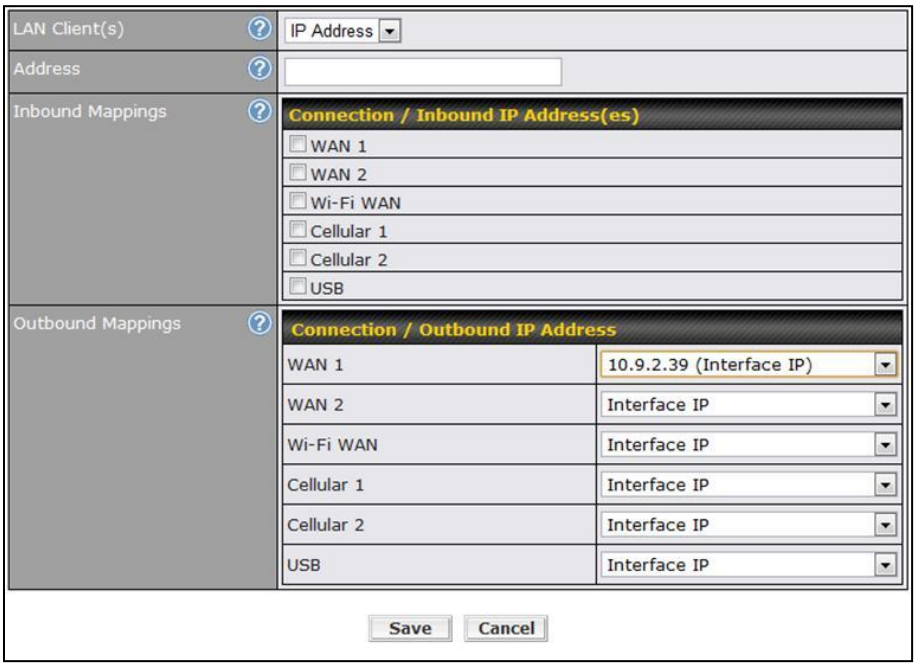
The configuration of NAT Mappings allows the IP address mapping of all inbound and outbound NAT'd traffic to and from an internal client IP address.

The settings to configure NAT Mappings are located at ***Advanced > NAT Mappings***:



To add a rule for NAT Mappings, click **Add NAT Rule** 

, upon which the following screen will be displayed:



Click **Save**

to save the settings when configuration has been completed.

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NAT Mapping Settings	
LAN Client(s)	NAT Mapping rules can be defined for a single LAN **IP Address**, an **IP Range**, or an **IP Network**.
Address	This refers to the LAN host's private IP address. The system maps this address to a number of public IP addresses, specified below, in order to facilitate inbound and outbound traffic. This option is only available when **IP Address** is selected.
Range	The IP range is a contiguous group of private IP addresses used by the LAN host. The system maps these addresses to a number of public IP addresses, specified below, to facilitate outbound traffic. This option is only available when **IP Range** is selected.
Network	The IP network refers to all private IP addresses and ranges managed by the LAN host. The system maps these addresses to a number of public IP addresses, specified below, to facilitate outbound traffic. This option is only available when **IP Network** is selected.
Inbound Mappings	This setting specifies the WAN connections and corresponding WAN-specific Internet IP addresses on which the system should bind on. Any access to the specified WAN connection(s) and IP address(es) will be forwarded to the LAN Host. This option is only available when **IP Address** is selected in LAN Client(s) field. Note 1: Inbound Mapping is not needed for WAN connections in drop-in or IP forwarding mode. Note 2: Each WAN IP address can be associated to one NAT Mapping only.
Outbound Mappings	This setting specifies the WAN IP addresses should be used when an IP connection is made from a LAN host to the Internet. Each LAN host in an IP range or IP network will be evenly mapped to one of each selected WAN's IP addresses (for better IP address utilization) in a persistent manner (for better application compatibility). Note 1: If you do not want to use a specific WAN for outgoing accesses, you should still choose default here, then customize the outbound access rule in the Outbound Policy section. Note 2: WAN connections in drop-in or IP forwarding mode are not shown here.

Important Note
Inbound firewall rules override the Inbound Mapping settings.

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15 QoS

15.1 User Groups

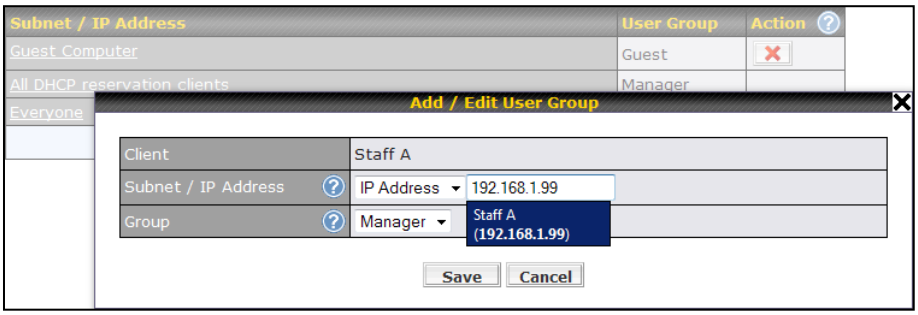
LAN and PPTP clients can be categorized into three user groups - **Manager, Staff, and Guest**. This table allows you to define rules and assign client IP addresses or subnets to a user group. You can apply different bandwidth and traffic prioritization policies on each user group in the Bandwidth Control and Application sections.

The table is automatically sorted, and the table order signifies the rules' precedence. The smaller and more specific subnets are put towards the top of the table and have higher precedence; larger and less specific subnets are placed towards the bottom.

Click the **Add** button

to define clients and their user group. Click the button to remove the defined rule.

Two default rules are pre-defined and put at the bottommost. They are **All DHCP reservation clients** and **Everyone**, and they cannot be removed. **All DHCP reservation clients** represents the LAN clients defined in the DHCP Reservation table in the LAN settings page. **Everyone** represents all clients that are not defined in any rule above. Click on a rule to change its group.



Add / Edit User Group	
Subnet / IP Address	From the drop-down menu, choose whether you are going to define the client(s) by an **IP Address** or a **Subnet**. If IP Address is selected, enter a name defined in DHCP Reservation table or a LAN client's IP address. If Subnet is selected, enter a subnet address and specify its subnet mask.
Group	This field is to define which **User Group** the specified Subnet / IP Address belongs to.

Once users have been assigned to a user group, their Internet traffic will be restricted by rules defined for that particular group. Please refer to the following two sections for details.

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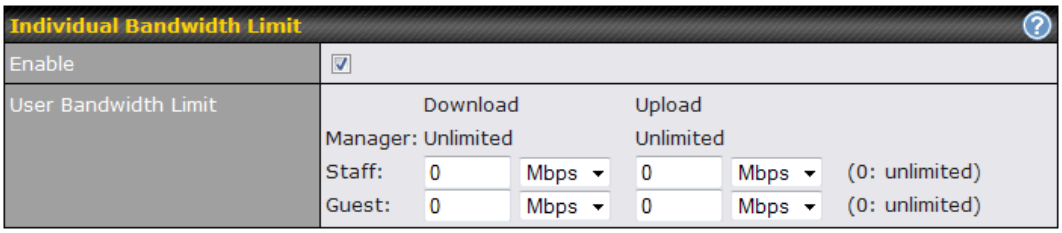
15.2 Bandwidth Control

You can define a maximum download speed (over all WAN connections) and upload speed (for each WAN connection) that each individual Staff and Guest member can consume. No limit can be imposed on individual Manager members.

By default, Download and Upload Bandwidth Limits are set to unlimited (set as **0**).



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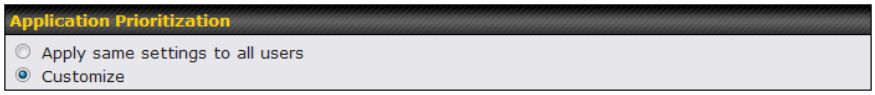
15.3 Application

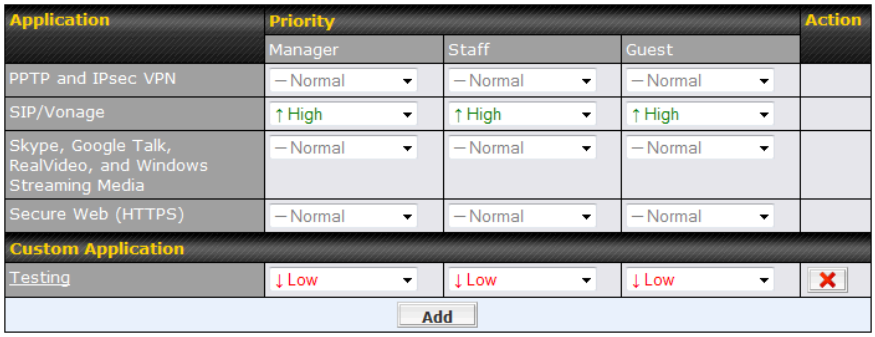
15.3.1 Application Prioritization

You can choose whether to apply the same Prioritization settings to all user groups or customize the settings for each group.



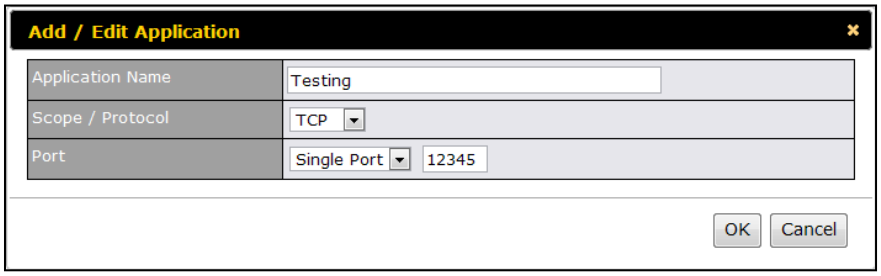
Three priority levels can be set for application prioritization: ↑ **High**, — **Normal**, and ↓ **Low**.

Four types of applications are predefined. Their priority for each user group can be selected from their corresponding drop down menu. Traffic types not defined in the table is assigned with normal priority.



15.3.2 Prioritization for Custom Application

Click the **Add** button to define a custom application. Click the button in the **Action** column to delete the custom application in the corresponding row.



Application Prioritization	
PPTP and IPsec VPN	When enabled, any PPTP and IPsec traffic will be prioritized.
SIP/Vonage	When enabled, any SIP and Vonage voice traffic will be prioritized.
Skype, Google Talk, Real Video, and Windows Streaming Media	When enabled, voice and video traffic of Skype, Google Talk, Real Video and Windows Streaming Media will be prioritized.
Secure Web (HTTPS)	When enabled, HTTPS (TCP port 443) traffic will be prioritized.

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15.3.3 DSL/Cable Optimization

DSL/cable-based WAN connection has its upload bandwidth lower than the download bandwidth. When this option is enabled, the download bandwidth of the WAN can be fully utilized in any situation.

When a DSL/cable circuit's uplink is congested, the download bandwidth will be affected. Users will not be able to download data in full speed until the uplink becomes less congested. The DSL/Cable Optimization can relieve such issue. When it is enabled, the download speed will become less affected by the upload traffic.

By default, this feature is **enabled**.

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16 Firewall

A firewall is a mechanism that selectively filters data traffic between the WAN side (the Internet) and the LAN side of the network. It can protect the local network from potential hacker attacks, offensive Web sites, and/or other inappropriate uses.

The firewall functionality of Pepwave MAX supports the selective filtering of data traffic in both directions:

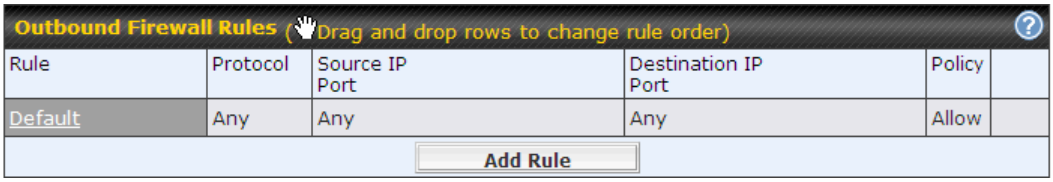
- Outbound (LAN to WAN)
- Inbound (WAN to LAN)
- Intrusion Detection and DoS Prevention

With SpeedFusion™ enabled (see Section 10), the firewall rules also apply to VPN tunneled traffic.

16.1 Outbound and Inbound Firewall

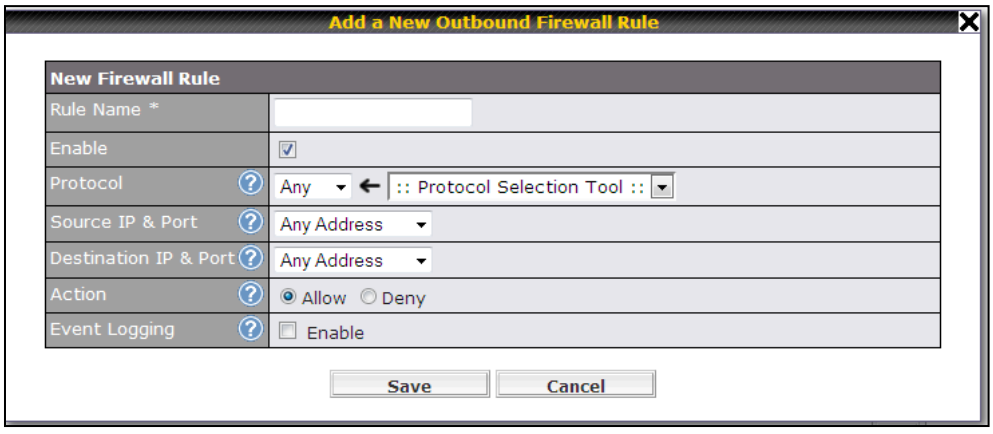
16.1.1 Access Rules

The outbound firewall settings are located at: ***Advanced > Firewall > Outbound Firewall Rule.***

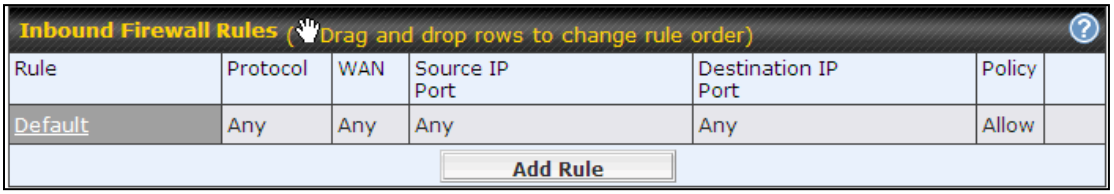


Upon clicking **Add Rule**

, the following screen appears:



The Inbound firewall settings are located at: ***Advanced > Firewall > Inbound Firewall Rule.***



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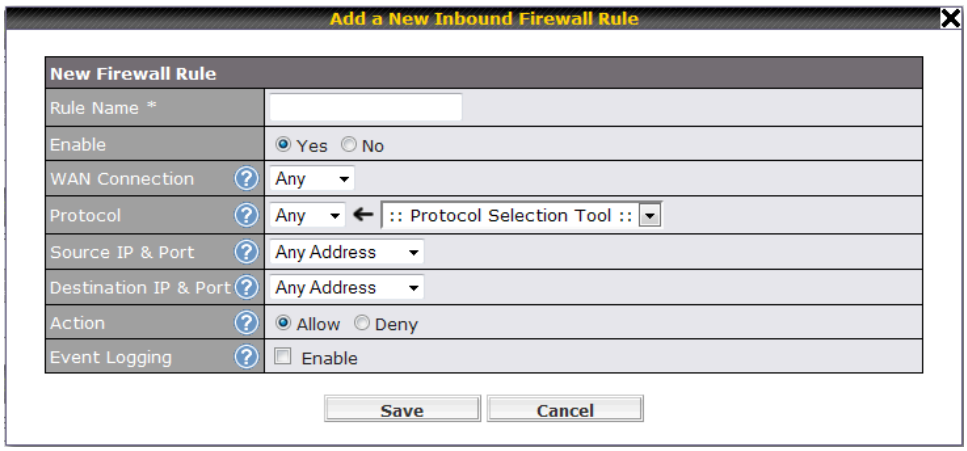
Once you click on **Add Rule**

the following window will appear.



Rules are matched from top to the bottom. If a connection matches any one of the upper rules, the matching process will stop. If none of the rules is matching, the **Default** rule will be applied.

By default, the **Default** rule is set as **Allow** for both outbound and inbound accesses.

Inbound / Outbound Firewall Settings	
Rule Name	This setting specifies a name for the firewall rule.
Enable	This setting specifies whether the firewall rule should take effect. When **Yes** is selected, the firewall rule takes effect. If the traffic matches the specified Protocol/IP/Port, actions will be taken by Pepwave MAX based on the other parameters of the rule. When **No** is selected, the firewall rule does not take effect. Pepwave MAX will disregard the other parameters of the rule.
WAN Connection	This setting is applicable to Inbound Firewall Rules only. This setting specifies which WAN connection(s) the rule applies to: • **WAN 1** • **WAN 2** • **Wi-Fi WAN** • **Cellular 1** • **Cellular 2** • **USB** A value of **WAN 1, WAN 2, Wi-Fi WAN, Cellular 1, Cellular 2, … and USB** specifies that the rule applies to all WAN connections, Ethernet WAN, PC Card, … and Wi-Fi WAN, respectively.
Protocol	This setting specifies the protocol to be matched by the rule. Via a drop-down menu, the following protocols can be specified: • **TCP** • **UDP** • **ICMP** • **IP**

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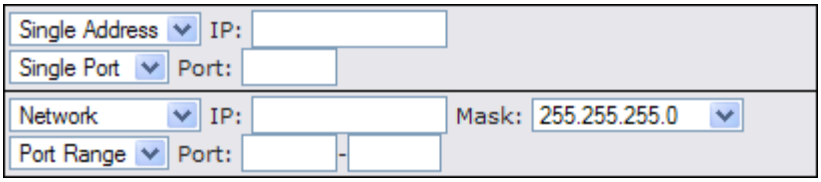
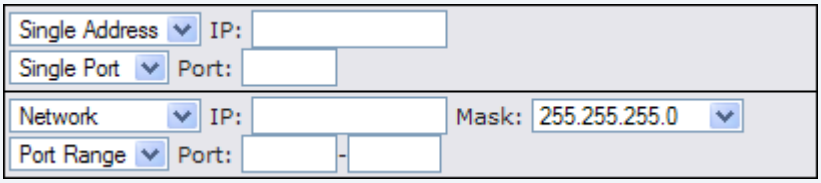
	Alternatively, the **Protocol Selection Tool** drop-down menu can be used to automatically fill in the Protocol and Port number of common Internet services (e.g. HTTP, HTTPS, etc.) After selecting an item from the Protocol Selection Tool drop-down menu, the Protocol and Port number remains manually modifiable.
Source IP & Port	This specifies the source IP address(es) and port number(s) to be matched for a firewall rule. A single address, or a network, can be specified as the Source IP & Port setting, as indicated with the following screenshots:  In addition, a single port, or a range of ports, can be specified for the Source IP & Port setting.
Destination IP & Port	This specifies the destination IP address(es) and port number(s) to be matched for a firewall rule. A single address, or a network, can be specified as the Source IP & Port setting, as indicated with the following screenshots:  In addition, a single port, or a range of ports, can be specified for the Source IP & Port setting.
Action	This setting specifies the action to be taken by Pepwave MAX upon encountering traffic that matches the both of the following: • Source IP & Port • Destination IP & Port • With the value of **Allow** for the Action setting, the matching traffic passes through Pepwave MAX (to be routed to the destination). • If the value of the Action setting is set to **Deny**, the matching traffic does not pass through Pepwave MAX (and is discarded).
Event Logging	This setting specifies whether or not to log matched firewall events. The logged messages are shown on the page **Status >Event Log**. A sample message is as follows: `Aug 13 23:47:44 Denied CONN=Ethernet WAN SRC=20.3.2.1 DST=192.168.1.20 LEN=48 PROTO=TCP SPT=2260 DPT=80` • **CONN**: The connection where the log entry refers to • **SRC**: Source IP address • **DST**: Destination IP address • **LEN**: Packet length • **PROTO**: Protocol • **SPT**: Source port • **DPT**: Destination port

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Tip
If the default inbound rule is set as **Allow** for NAT enabled WANs, no inbound Allow firewall rules will be required for inbound Port Forwarding and inbound NAT Mapping rules. However, if the default inbound rule is set as **Deny**, a corresponding Allow firewall rules will be required.

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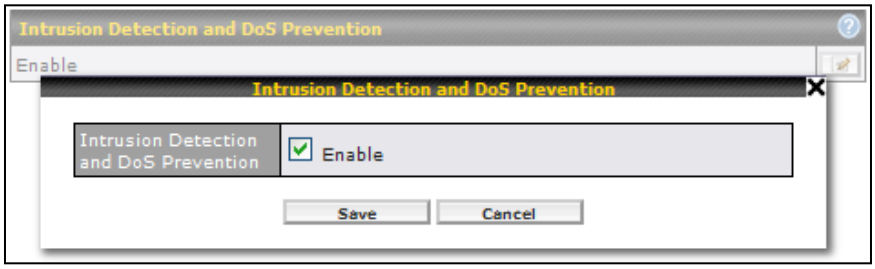
16.2 Intrusion Detection and DoS Prevention



The Pepwave MAX supports detecting and preventing intrusions and Denial-of-Service (DoS) attacks from the Internet. To turn on this feature, click , check the box **Enable** for the **Intrusion Detection and DoS Prevention** and press the **Save** button.

When this feature is enabled, the Pepwave MAX will detect and protect the network from the following kinds of intrusions and denial-of-service attacks.

- Port Scan:
  - NMAP FIN/URG/PSH
  - Xmas Tree
  - Another Xmas Tree
  - Null Scan
  - SYN/RST
  - SYN/FIN
- SYN Flood Prevention
- Ping Flood Attack Prevention

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17 Miscellaneous Settings

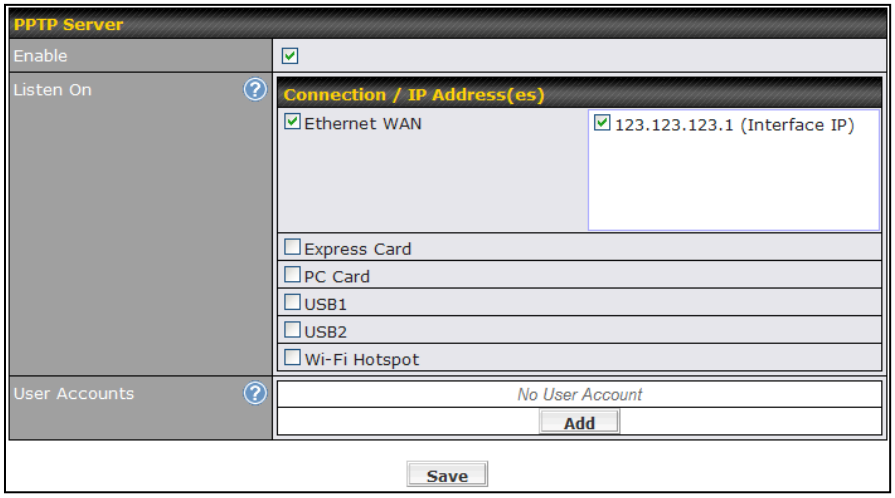
The miscellaneous settings include configuration for PPTP Server, Service Forwarding, and Service Passthrough.

17.1 PPTP Server

Pepwave MAX has a built-in PPTP Server, which enables remote computers to conveniently and securely access the local network.

PPTP server setting is located at ***Advanced > Misc. Settings > PPTP Server.***

Simply check the box to enable the PPTP server function. All connected PPTP sessions are displayed on the Client List at ***Status > Client List***. Please refer to section 19.3 for details.



PPTP Server Setting	
Listen On	This setting is for specifying the WAN connection(s) and IP address(es) where the PPTP server should listen on.
User Accounts	This setting allows you to define the PPTP User Accounts. Click **Add** to input username and password to create an account. After adding the user accounts, you can click on a username to edit the account password. Click the button to delete the account in its corresponding row.

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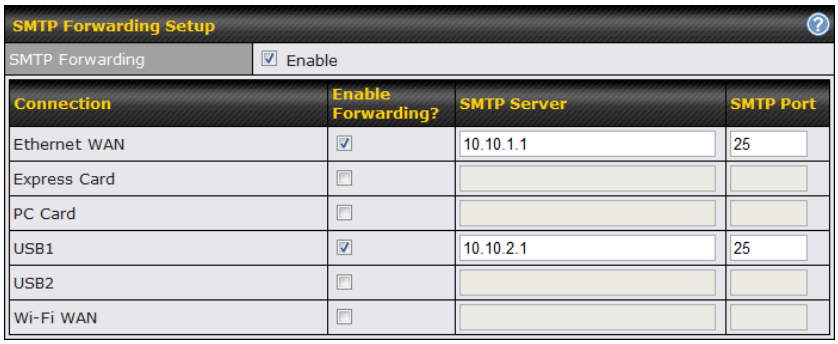
17.2 Service Forwarding

Service Forwarding settings are located at ***Advanced > Misc. Settings > Service Forwarding***:

Service Forwarding	
SMTP Forwarding	When this option is enabled, all outgoing SMTP connections destined for any host at TCP port 25 will be intercepted. These connections will be redirected to a specified SMTP server and port number. SMTP server settings for each WAN can be specified after selecting **Enable**.
Web Proxy Forwarding	When this option is enabled, all outgoing connections destined for the proxy server specified in Web Proxy Interception Settings will be intercepted. These connections will be redirected to a specified web proxy server and port number. Web Proxy Interception Settings and proxy server settings for each WAN can be specified after selecting **Enable**.
DNS Forwarding	When this option is enabled, all outgoing DNS lookups will be intercepted and redirected to the built-in DNS name server. If any LAN device is using DNS name servers of a WAN connection, you may want to enable this option to enhance the DNS availability without modifying the DNS server setting of the clients. The built-in DNS name server will distribute DNS lookups to corresponding DNS servers of all available WAN connections. In this case, DNS service will not be interrupted even if any WAN connection is down.

17.2.1 SMTP Forwarding

Some ISPs require their users to send e-mails via the ISP's SMTP server. All outgoing SMTP connections are blocked except those connecting to the ISP's. The Pepwave MAX supports intercepting and redirecting all outgoing SMTP connections (destined for TCP port 25) via a WAN connection to the WAN's corresponding SMTP server.



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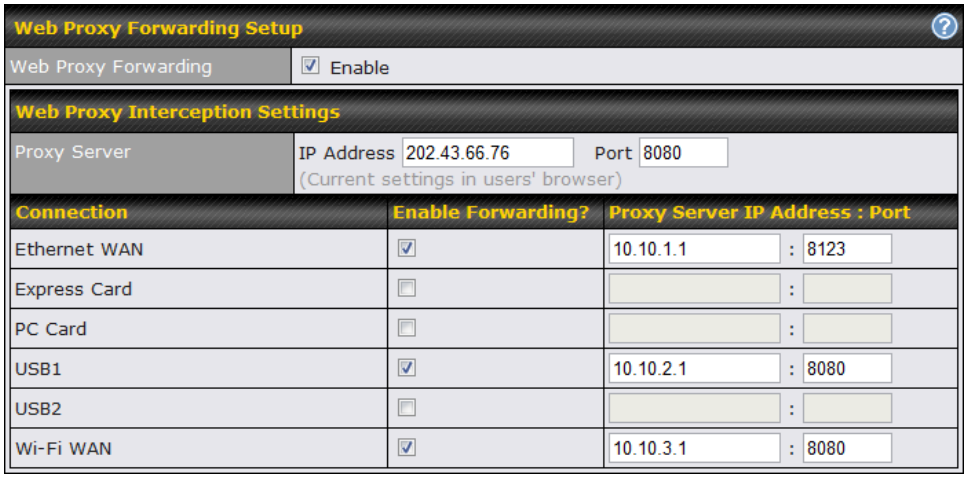
To enable the feature, select the **Enable** check box under **SMTP Forwarding Setup**. Check the box **Enable Forwarding?** For the WAN connection(s) that needs such forwarding. Enter the ISP's e-mail server address and TCP port number for each WAN.

The Pepwave MAX will intercept SMTP connections, choose a WAN with reference to the Outbound Policy, and then forward the connection to the forwarded SMTP server if the chosen WAN has enabled forwarding. If the forwarding is disabled for a WAN connection, SMTP connections for the WAN will be simply forwarded to the connection's original destination.

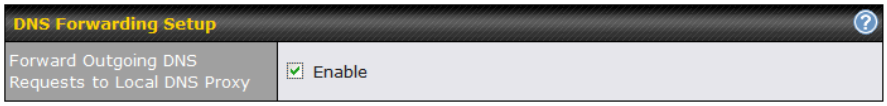
Note
If you want to route all SMTP connections only to particular WAN connection(s), you should create a rule in Outbound Policy (see section 12.2).

17.2.2 Web Proxy Forwarding



When this feature is enabled, the Pepwave MAX will intercept all outgoing connections destined for the proxy server specified in **Web Proxy Interception Settings**, choose a WAN connection with reference to the Outbound Policy, and then forward them to the specified web proxy server and port number. Redirected server settings for each WAN can be set here. If forwarding is disabled for a WAN, web proxy connections for the WAN will be simply forwarded to the connection's original destination.

17.2.3 DNS Forwarding



When DNS Forwarding is enabled, all clients' outgoing DNS requests will also be intercepted and forwarded to the built-in DNS proxy server.

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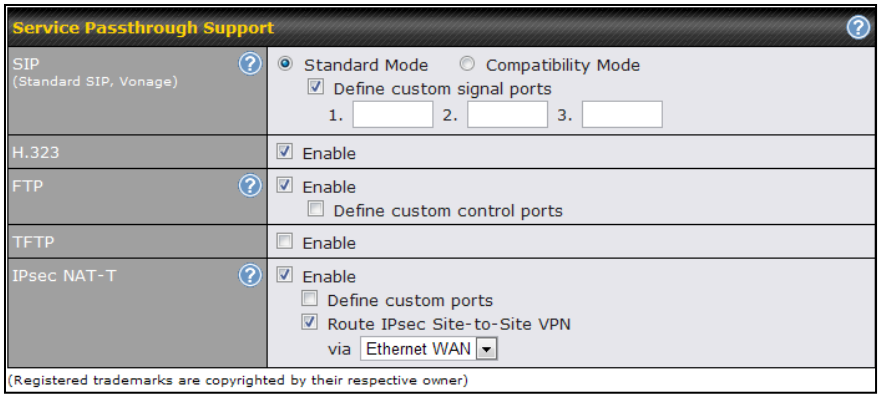
17.3 Service Passthrough

Service Passthrough settings can be found in ***Advanced > Misc. Settings > Service Passthrough***:



Some Internet services required to be specially handled in a multi-WAN environment. The Pepwave MAX supports handling such services correctly such that Internet applications do not notice it is behind a multi-WAN router. Settings for Service Passthrough Support are available here.

Service Passthrough Support	
SIP	Session Initiation Protocol, aka SIP, is a voice-over-IP protocol. Pepwave MAX can act as a SIP Application Layer Gateway (ALG) which binds connections for the same SIP session to the same WAN connection and translate IP address in the SIP packets correctly in NAT mode. Such passthrough support is always enabled and there are two modes for selection: **Standard Mode** and **Compatibility Mode**. If your SIP server's signal port number is non-standard, you can check the box **Define custom signal ports** and input the port numbers to the text boxes.
H.323	With this option enabled, protocols that provide audio-visual communication sessions will be defined on any packet network and passthrough the device.
FTP	FTP sessions consist of two TCP connections; one for control and one for data. In multi-WAN situation, they have to be binded to the same WAN connection. Otherwise, problems will arise in transferring files. By default, the Pepwave MAX monitors TCP control connections on port 21 for any FTP connections and binds TCP connections of the same FTP session to the same WAN. If you have an FTP server listening on a port number other than 21, you can check the box **Define custom control ports** and enter the port numbers to the text boxes.
TFTP	The Pepwave MAX monitors outgoing TFTP connections and routes any incoming TFTP data packets back to the client. Select **Enable** if you want to enable the TFTP Passthrough support.
IPsec NAT-T	This field is for enabling the support of IPsec NAT-T Passthrough. UDP ports 500, 4500 and 10000 are monitored by default. You may add more custom data ports that your IPsec system uses by checking the box Define custom ports. If the VPN contains IPsec Site-to-Site VPN traffic, you have to check the box Route IPsec Site-to-Site VPN and choose the WAN connection to route the traffic to. If you have IPsec SpeedFusion™ traffic routed, check the Route IPsec SpeedFusion™ option and select a WAN to force routing such traffic to the specified WAN.

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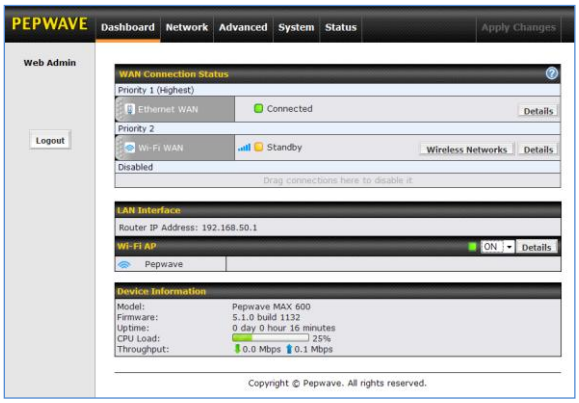
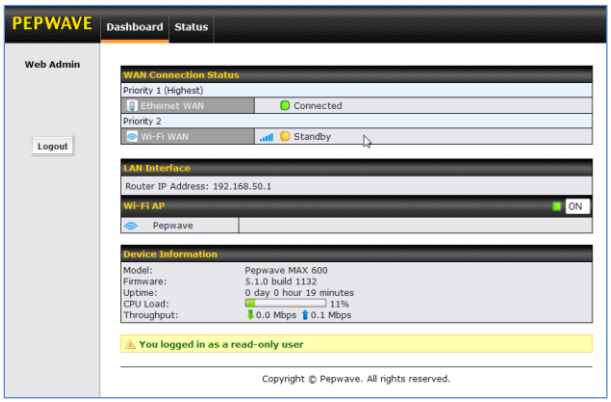
18 System Settings

18.1 Admin Security

There are two user accounts available for accessing the Web Admin. Usernames are **admin** and **user**. They represent two user levels - **admin** has full administration access, while **user** is a read-only account. The read-only account can only access the device's status information and cannot make any change on the device.



Admin Account UI



User Account UI

A web login session will be logged out automatically when it has been idle longer than the **Web Session Timeout**. Before the session expires, you may click the Logout button in the Web Admin to exit the session

0 hours 0 minutes signifies an unlimited session time. This setting should be used only in special situations, as it will lower the system security level if users do not logout before closing the browser.

Default: 4 hours 0 minutes.

For security reason, after logging in to the Web Admin Interface for the first time, it is recommended to change the administrator password.

Configuring the administration interface to be accessible only from the LAN can further improve system security.

Administrative Settings configuration is located at ***System > Admin Security***:

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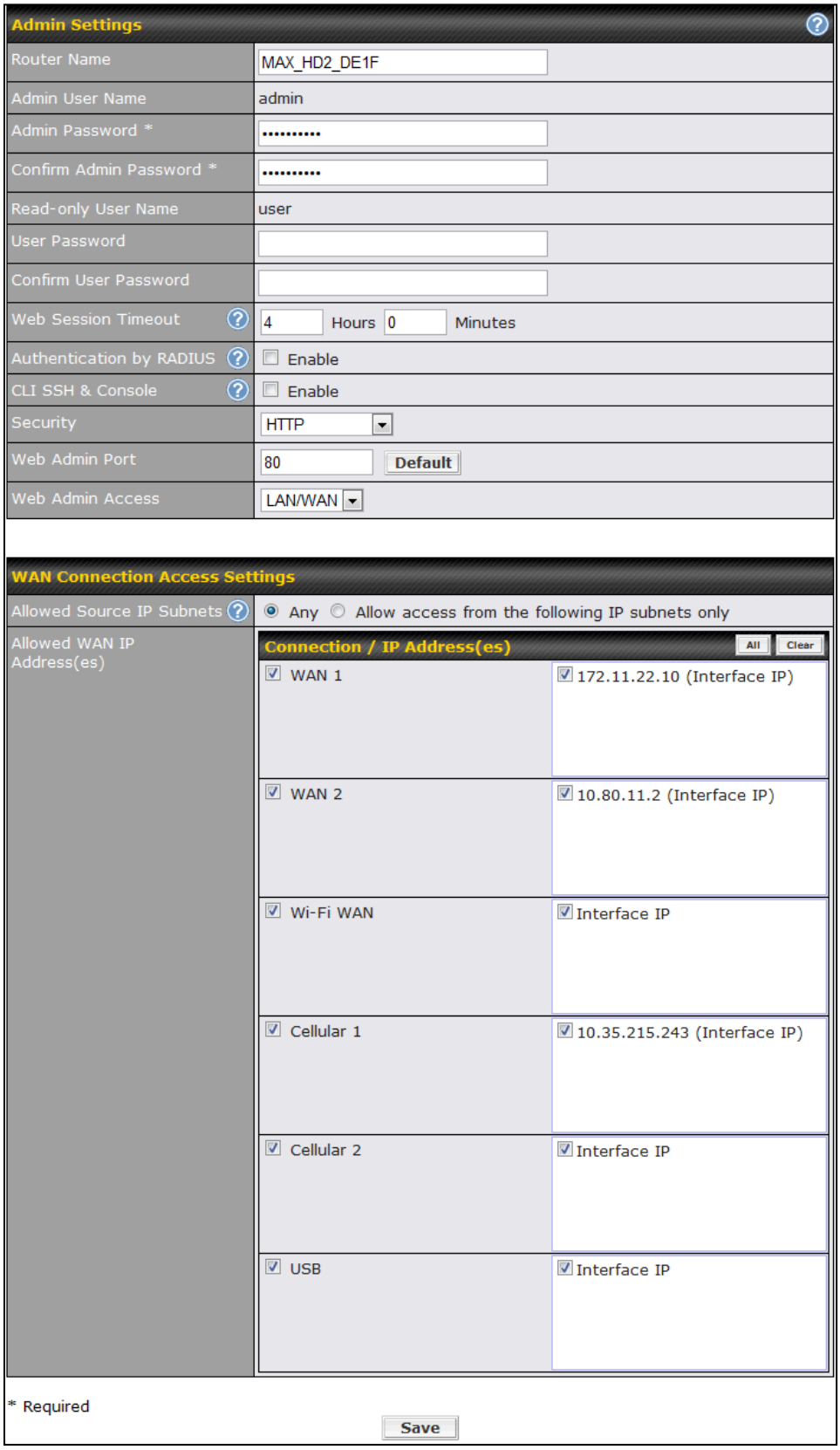

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Admin Settings	
Router Name	This field allows you to define a name for this Pepwave MAX unit. By default, Router Name is set as **MAX_XXXX**, where XXXX refers to the last 4 digits of the serial number of the device.
Admin User Name	It is set as **admin** by default and is not customizable.
Admin Password	This field allows you to specify a new administrator password.
Confirm Admin Password	This field allows you to verify and confirm the new administrator password.
Read-only User Name	It is set as **user** by default and is not customizable.
User Password	This field allows you to specify a new user password. Once the user password is set, the feature of read-only user will be enabled.
Confirm User Password	This field allows you to verify and confirm the new user password.
Web Session Timeout	This field specifies the number of hours and minutes that a web session can remain idle before the device terminates its access to Web Admin Interface. By default, it is set as **4 hours**.
Authentication by RADIUS	With this box is checked, Web Admin will authenticate using an external RADIUS server. Authenticated users are treated as "admin" users with full read-write permission. Local "admin" and "user" accounts will be disabled. When the device is not able to communicate with the external RADIUS server, local accounts will be enabled again for emergency access. Authentication options will be available once this box is checked.
Auth Protocol	This specifies the authentication protocol used. Available options are **MS-CHAP v2** and **PAP**.
Auth Server	This specifies the access address of the external RADIUS server.
Auth Server Secret	This is the secret for accessing the RADIUS server.
Auth Timeout	This option specifies the time value for authentication timeout.
Accounting Server	This specifies the access address of the external Accounting server.
Accounting Server Secret	This is the secret for accessing the Accounting server.
Network Connection	This option is for specifying the network connection which will be used for authentication connection. Users can choose from LAN, WAN and VPN connections.
Security	This option is for specifying the protocol(s) through which the Web Admin Interface can be accessible: • HTTP • HTTPS • HTTP/HTTPS
Web Admin Port	These fields are for specifying the port number at which the Web Admin Interface can be accessible.
Web Admin Access	This option is for specifying the network interfaces through which the Web Admin

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Interface can be accessible:

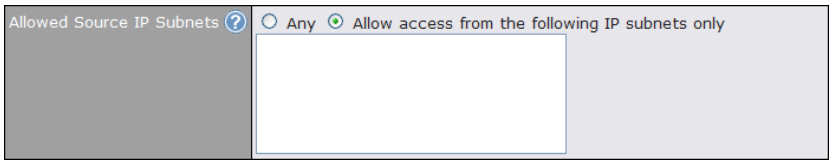
- LAN only
- LAN/WAN
- If LAN/WAN is chosen, a WAN Connection Access Settings form will be displayed.

WAN Connection Access Settings

Allowed Source IP Subnets

This field allows you to restrict web admin access only from defined IP subnets.

- **Any** - Allow web admin accesses to be from anywhere, without IP address restriction.
- **Allow access from the following IP subnets only** - Restrict web admin access only from the defined IP subnets. When this is chosen, a text input area will be displayed beneath:



The allowed IP subnet addresses should be entered into this text area. Each IP subnet must be in form of w.x.y.z/m

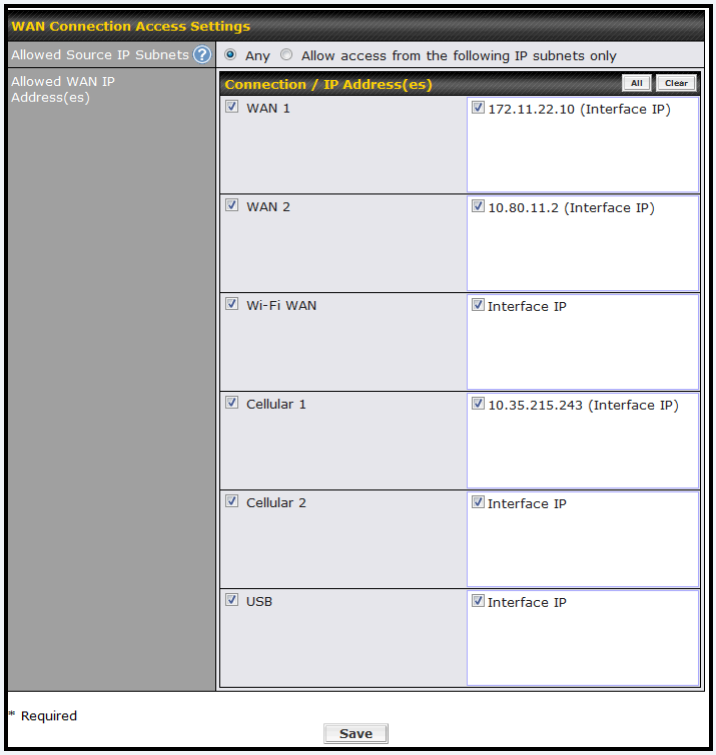
Where w.x.y.z is an IP address (e.g. 192.168.0.0), and m is the subnet mask in CIDR format, which is between 0 and 32 inclusively. For example: 192.168.0.0/24

To define multiple subnets, separate each IP subnet one in a line. For example:

- 192.168.0.0/24
- 10.8.0.0/16

Allowed WAN IP Address(es)

This is to choose which WAN IP address(es) the web server should listen on.



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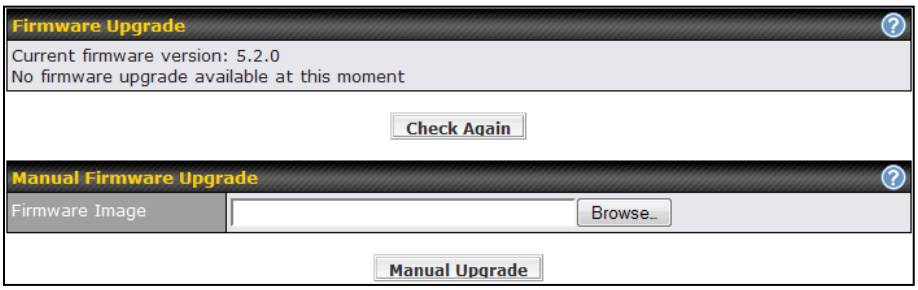
18.2 Firmware Upgrade

The firmware of Pepwave MAX is upgradeable through Web Admin Interface.

Firmware upgrade functionality is located at ***System > Firmware***:



There are two ways to upgrade the unit. The first method is online firmware upgrade. The system can Check, Download and Upgrade over the Internet. The second method is to upload a firmware file manually.

Click on the **Check again** button to use online upgrade. With online upgrade, Pepwave MAX checks online for new firmware. If a new firmware is available, the Pepwave MAX will automatically download the firmware. The upgrade process will subsequently be automatically initiated.

You may also download a firmware image from the Pepwave web site and update the unit manually. Click **Browse** to select the firmware file from the local computer, and then click **Manual Upgrade** to send the firmware to Pepwave MAX. Pepwave MAX will then automatically initiate the firmware upgrade process.

Please note that all Pepwave devices are equipped to be able to store two different firmware versions in two different partitions. A firmware upgrade preformed will always replace the inactive partition. If you want to keep the inactive firmware, you can simply reboot your device with the inactive firmware and then perform the firmware upgrade.

Important Note
The firmware upgrade process may not necessarily preserve the previous configuration, and the behavior varies on a case-by-case basis. Consult the Release Notes for the particular firmware version. Do not disconnect the power during firmware upgrade process. Do not attempt to upload a non-firmware file, or a firmware file that is not qualified, or not supported, by Pepwave. Upgrading a Pepwave MAX with an invalid firmware file will damage the unit, and may void the warranty.

Important Note
If the firmware is rolled back from 5.x to 4.x, the configurations will be lost.

18.3 Time

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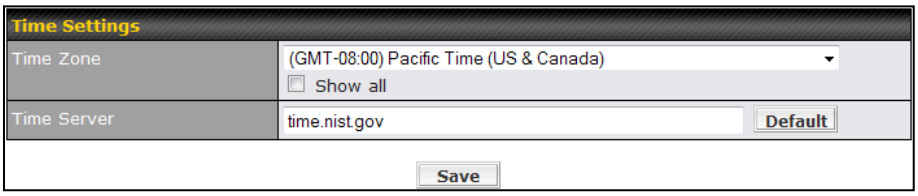
The Time Server functionality enables the system clock of Pepwave MAX to be synchronized with a specified Time Server.

The settings for Time Server configuration are located at ***System > Time***:

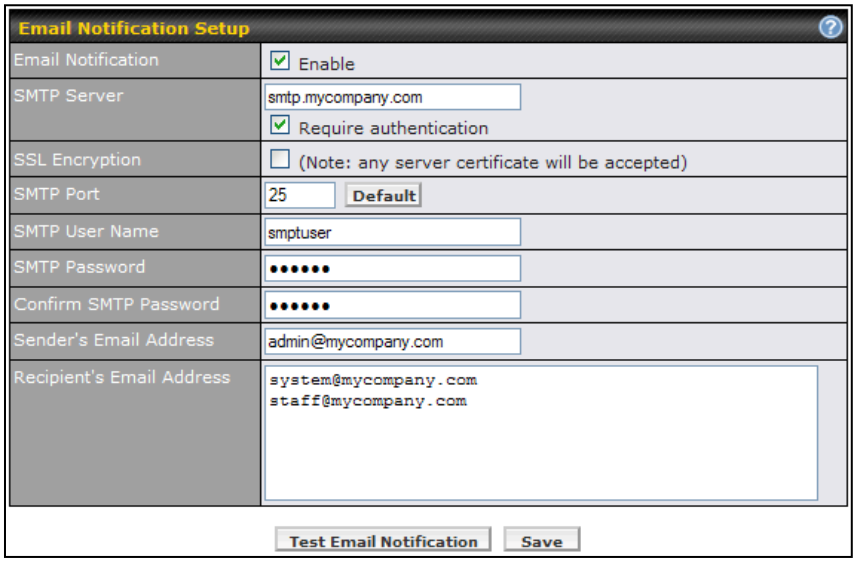


Time Server Settings	
Time Zone	This specifies the time zone (along with the corresponding Daylight Savings Time scheme) in which Pepwave MAX operates. The Time Zone value affects the time stamps in the Event Log of Pepwave MAX and E-mail notifications. Checked the box **Show all** to show all available time zone options.
Time Server	This setting specifies the NTP network time server to be utilized by Pepwave MAX.

18.4 Email Notification

The Email Notification functionality of Pepwave MAX provides a System Administrator with up-to-date information on network status.

The settings for configuring Email Notification are found at ***System > Email Notification***:



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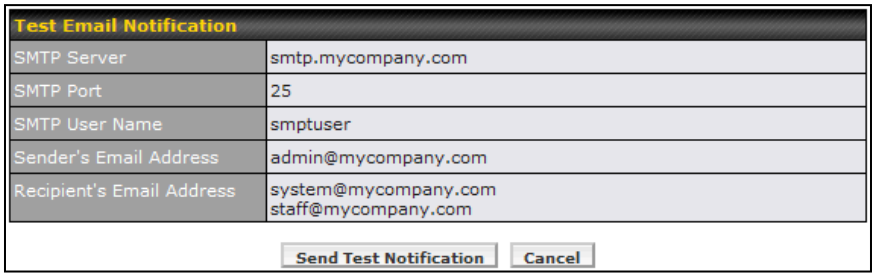
Email Notification Settings	
Email Notification	This option is for enabling Email Notification. If the box **Enable** is checked, Pepwave MAX sends email messages to a System Administrator when the WAN status changes, or when new firmware is available. If the box Enable is not checked, Email Notification is disabled and Pepwave MAX will not send email messages.
SMTP Server	This field is for specifying the SMTP server to be used for sending email. If the server requires authentication, check the box **Require authentication**.
SSL Encryption	Check the box to enable SMTPS. When the box is checked, the next field **SMTP Port** will be changed to **465** automatically.
SMTP Port	This field is for specifying the SMTP Port number. By default, this is set to 25; when the **SSL Encryption** box is checked, the default port number will be set to **465**. You may customize the port number by editing this field. Click the button **Default** to restore to default.
SMTP User Name / Password	This setting specifies the SMTP username and password while sending email. These options are shown only if **Require authentication** check box is checked in SMTP Server setting.
Confirm SMTP Password	This field allows you to verify and confirm the new administrator password.
Sender's Email Address	This setting specifies the sender email address reported by the email messages sent by Pepwave MAX.
Recipient's Email Address	This setting specifies the email addresses to which Pepwave MAX should send the email messages to. You may enter multiple recipients' email addresses in this field.

After you have completed the settings, you can click the **Test Email Notification** button to test the settings before saving it. After it is clicked, you will see this screen to confirm the settings:



Click **Yes** to confirm. Wait a few seconds, and you will see a return message and the detailed test result.

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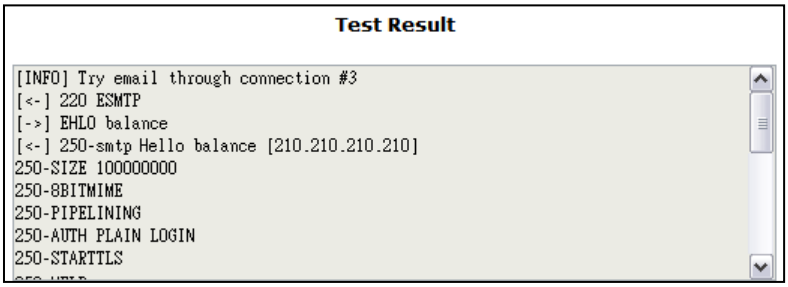

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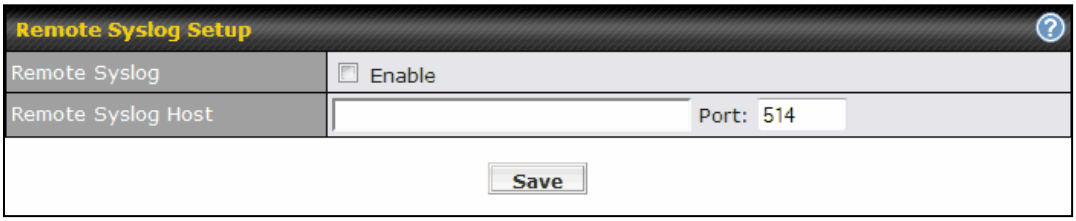
18.5 Remote Syslog

The Remote Syslog functionality of Pepwave MAX enables event logging at a specified remote Syslog server.

The settings for configuring Remote System Log are found at ***System> Remote Syslog***:



Remote Syslog Settings	
Remote Syslog	This setting specifies whether or not to log events at the specified remote Syslog server.
Remote Syslog Host	This setting specifies the IP address or host name of the remote Syslog server.
Port	This setting specifies the port number of the remote Syslog service. By default, the Port setting has value is **514**.

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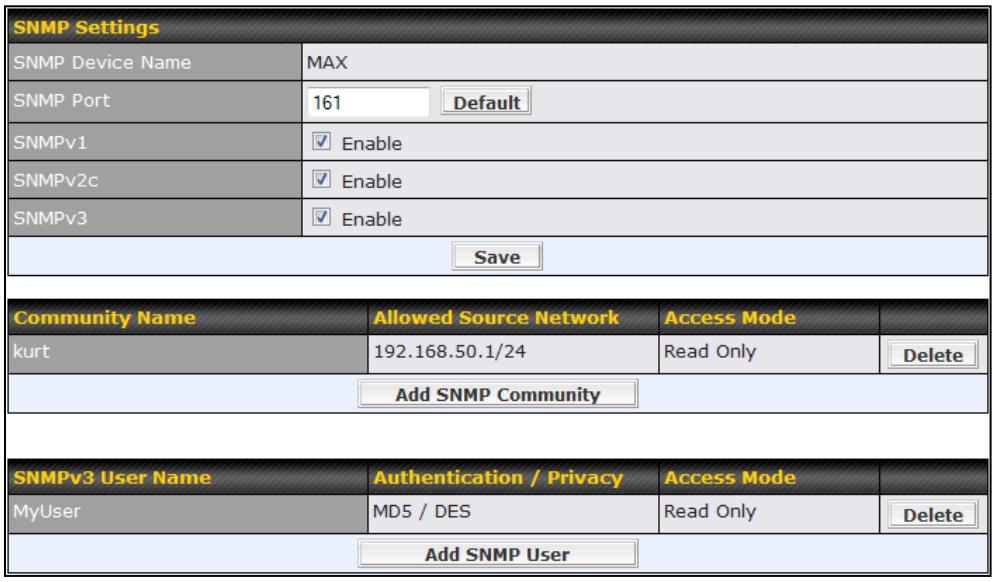
18.6 SNMP

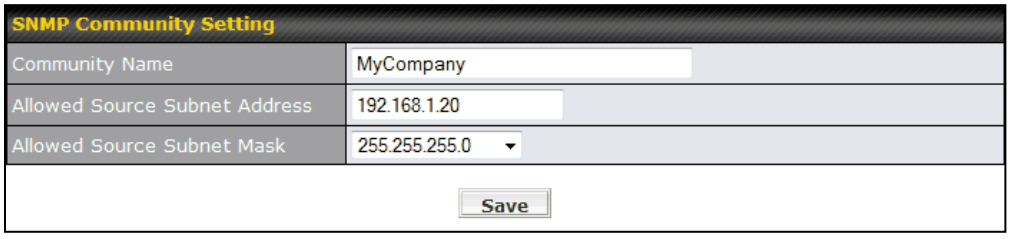
SNMP or Simple Network Management Protocol is an open standard that can be used to collect information from the Pepwave MAX Mobile Router.

SNMP configuration is located at ***System > SNMP***:



SNMP Settings	
SNMP Device Name	This field shows the router name defined in ***System > Admin Security***.
SNMP Port	This option specifies the port which SNMP used. The default port is set as **161**.
SNMPv1	This option allows you to enable SNMP version 1.
SNMPv2	This option allows you to enable SNMP version 2.
SNMPv3	This option allows you to enable SNMP version 3.

To add a community for either SNMPv1 or SNMPv2, click the **Add SNMP Community** button in the **Community Name** table, upon which the following screen will be displayed:



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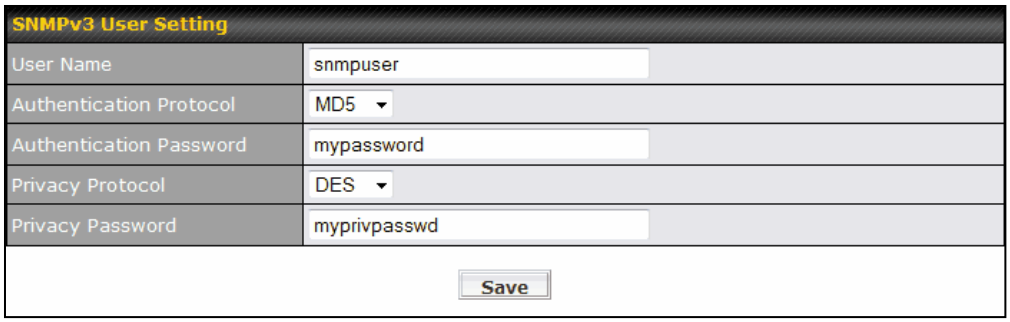
SNMP Community Settings	
Community Name	This setting specifies the SNMP Community Name.
Allowed Source Subnet Address	This setting specifies a subnet from which access to the SNMP server is allowed. Enter subnet address here (e.g. 192.168.1.0).
Allowed Source Subnet Mask	This setting specifies the subnet mask that corresponds to the subnet specified via Allowed Source Subnet Address (e.g. 255.255.255.0).

To define a user name for SNMPv3, click **Add SNMP User** in the **SNMPv3 User Name** table, upon which the following screen is displayed:



SNMPv3 User Settings	
User Name	This setting specifies a user name to be used in SNMPv3.
Authentication Protocol	This setting specifies via a drop-down menu the one of the following valid authentication protocols: • NONE • MD5 • SHA
Authentication Password	This setting specifies the authentication password, and is applicable only if the MD5 or SHA authentication protocol is selected.
Privacy Protocol	This setting specifies via a drop-down menu the one of the following valid privacy protocols: • NONE • DES
Privacy Password	This setting specifies the privacy password, and is applicable only if the DES privacy protocol is selected.

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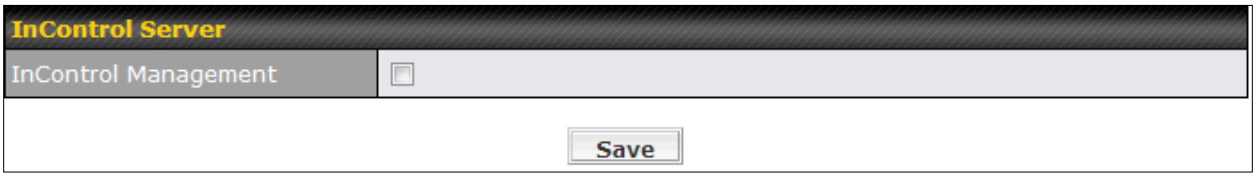
18.7 InControl



When this check box is checked, the device's status information, usage data, and configuration will be sent to Pepwave's InControl system. You can sign up for an InControl account at https://incontrol.pepwave.com/ . You can register devices under the account, monitor device status and usage reports, and download backed up configuration files.

Default: Disabled

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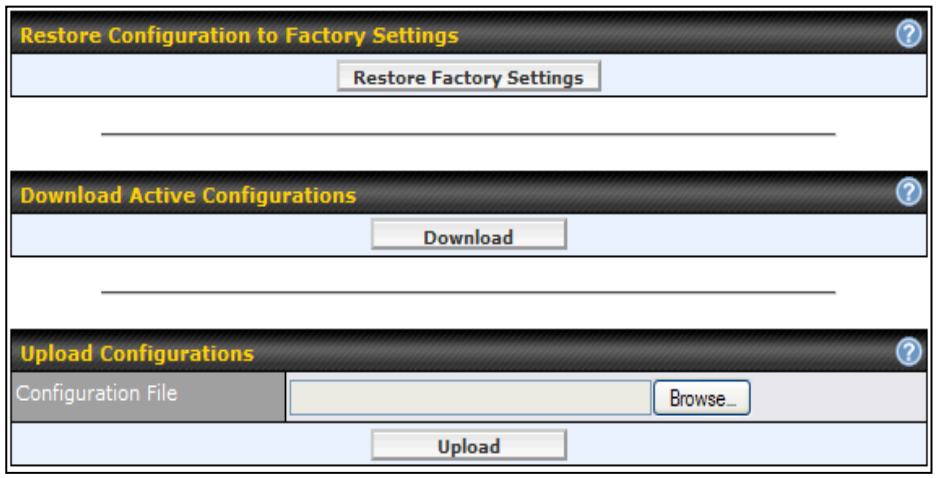
18.8 Configuration

Backing up the Pepwave MAX settings immediately after successful completion of the initial setup is strongly recommended.

The functionality to download and upload Pepwave MAX settings is found at ***System > Configuration***



18.8.1 Restore Configuration to Factory Settings

The **Restore Factory Settings** button is to reset the configuration to the factory default settings. You have to click the **Apply Changes** button to make the settings effective.

18.8.2 Downloading Active Configurations

The **Download** button is to backup the current active settings. Click **Download** and save the configuration file.

18.8.3 Uploading Configurations

To restore or change settings based on a configuration file, click **Browse…** to locate the configuration file on the local computer, and then click **Upload**.

The new settings can then be applied by clicking the **Apply Changes** button on the page header, or discard at the Main page of Web Administration Interface.

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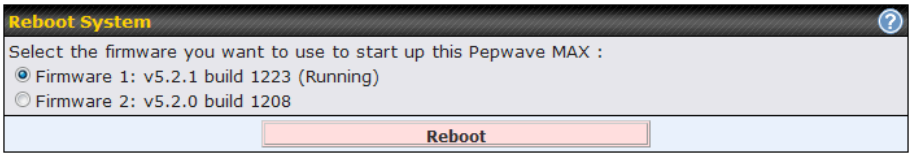
18.9 Reboot

This page provides a Reboot button for restarting the system.

For highest reliability, Pepwave MAX is equipped with two copies of firmware of different version. You can select the firmware version you would like the device to reboot with.

The firmware marked with **(Running)** is the current system boot up firmware.

Please note that a firmware upgrade will always replace the inactive firmware partition.


Reboot System
Select the firmware you want to use to start up this Pepwave MAX :
Firmware 1: v5.2.1 build 1223 (Running)
Firmware 2: v5.2.0 build 1208
Reboot

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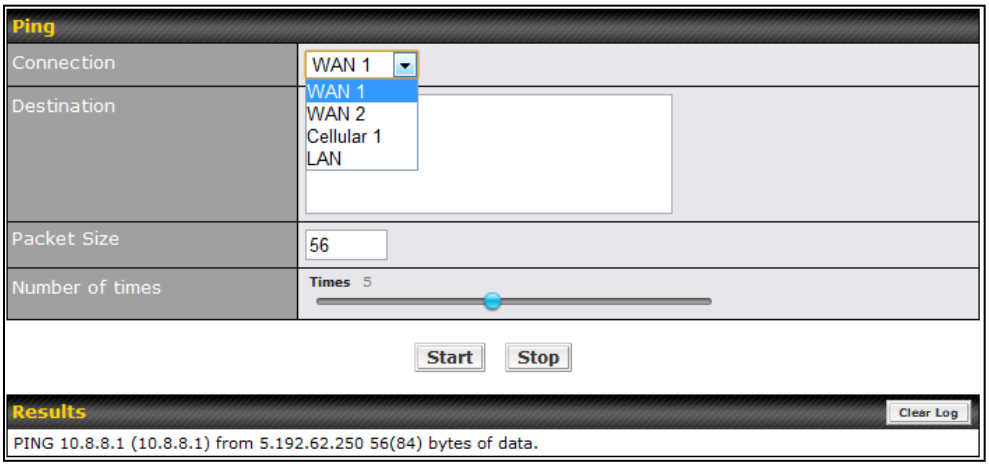
18.10 Ping Test

The Ping Test tool in Pepwave MAX performs Pings through a specified Ethernet interface or a SpeedFusion™ connection. You can specify the number of pings in the field **Number of times** to a maximum of 10 times, and Packet Size can be specified in the field **Packet Size** to a maximum of **1472** bytes.

The Ping utility is located at ***System > Tools > Ping,*** illustrated as follows:



Tip

A system administrator can use the Ping utility to manually check the connectivity of a particular LAN/WAN connection.

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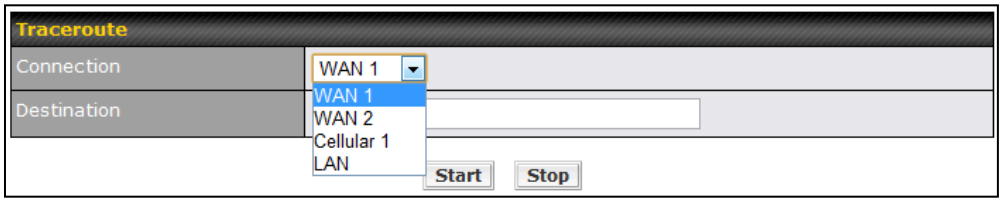
18.11 Traceroute Test

The Traceroute Test tool in Pepwave MAX traces the routing path to the destination through a particular Ethernet interface or SpeedFusion™ connection.

The Traceroute Test utility is located at ***System > Tools > Traceroute***, illustrated as follows:



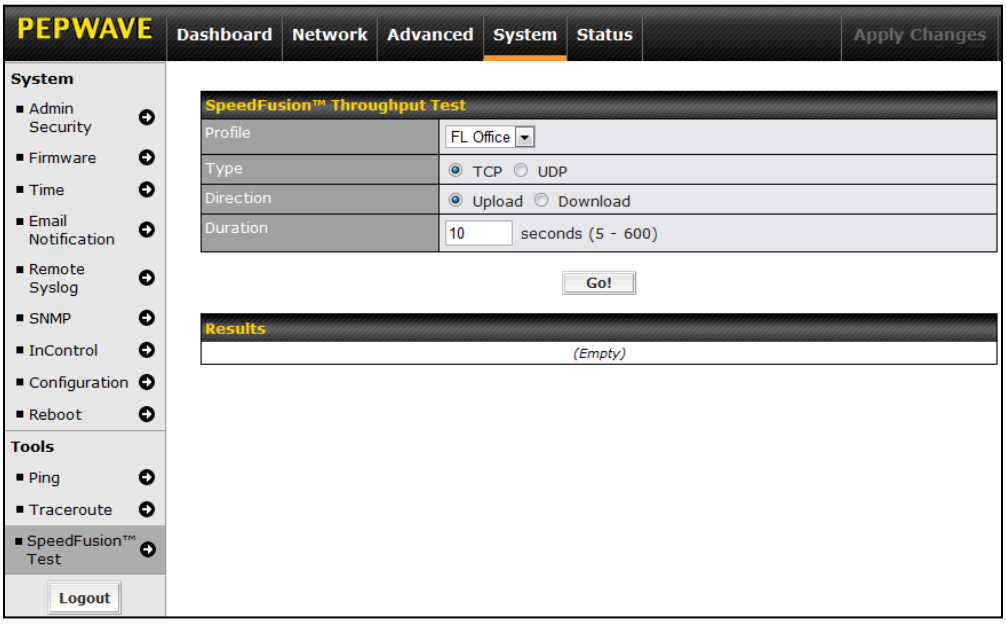
Tip

A system administrator can use the Traceroute utility to analyze the connection path of a LAN/WAN connection.

18.12 SpeedFusion™ Test

The SpeedFusion™ tool can help to test the throughput between different VPN peers.
You can define the **Test Type**, **Direction**, and **Duration** of the test, and press **Go!** to perform the throughput test.

The VPN Test utility is located at ***System > Tools > SpeedFusion™*** illustrated as follows:



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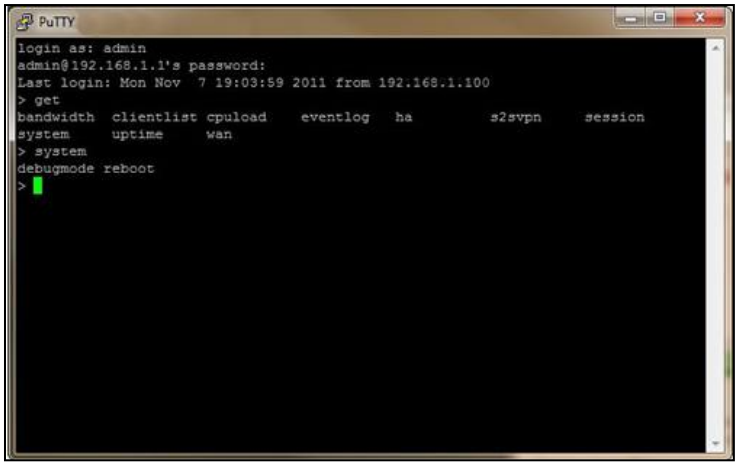
18.13 CLI (Command Line Interface Support)

The CLI (Command Line Interface) can be accessed via SSH. This field enables CLI support.

The below settings specify which TCP port and which interface(s) should accept remote SSH CLI access. The user name and password used for remote SSH CLI access are the same as those used for web admin access.



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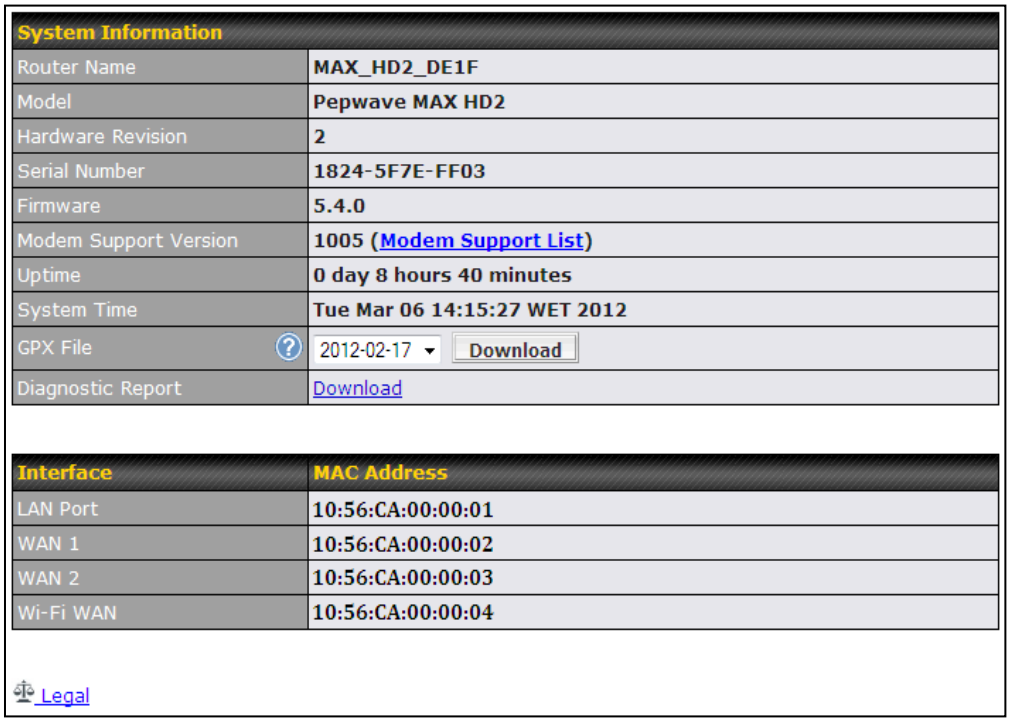
19 Status

This section displays the information of Pepwave MAX on the ***Device***, ***Active Sessions, Client List, WINS Client List,*** **SpeedFusion™*, UPnP / NAT-PMP***, ***Event Log***, and ***Bandwidth***.

19.1 Device

System information is located at ***Status > Device***:



System Information	
Router Name	This is the name specified in the field Router Name located in ***System > Admin Security***.
Model	This shows the model name and number of this device.
Hardware Revision	This shows the hardware version of this device.
Serial Number	This shows the serial number of this device.
Firmware	This shows the firmware version that this device is currently running.
Modem Support Version	This shows the modem support version of this device. A Modem Support List link redirects users to a list of cellular modems supported by this device.
Uptime	This shows the length of time since the device is rebooted.
System Time	This shows the current system time.
GPX File (HD2 Only)	This contains the GPS data of the latest 7 days. A Download button is for exporting the data in GPX format of the selected date. For more information about how GPS works in

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	HD2, please refer to section 19.1.1.
Diagnostic Report	A **Download** button is for exporting a diagnostic report file required for system investigation.

The second table shows the MAC address of each LAN/WAN interface connected.

Important Note
If you encounter issues and would like to contact Pepwave Support Team (http://www.pepwave.com/contact/), please download the diagnostic report file and attach it along with a description of your encountered issue. In firmware 5.1 or before, Diagnostic Report file can be obtained at ***System > Reboot***

19.1.1 GPS Data

The MAX HD2 automatically stores up to seven days of GPS location data in GPS eXchange format (GPX). To review this data using third-party applications, click ***Status > Device*** and then download your GPX file.

The Pepwave MAX HD2 exports real-time location data in NMEA format through its LAN IP address at TCP port 60660. It is accessible from LAN or over a SpeedFusion connection. To access the data via a virtual serial port, you have to install a virtual serial port driver. Visit http://www.peplink.com/index.php?view=faq&id=294 to download the driver.

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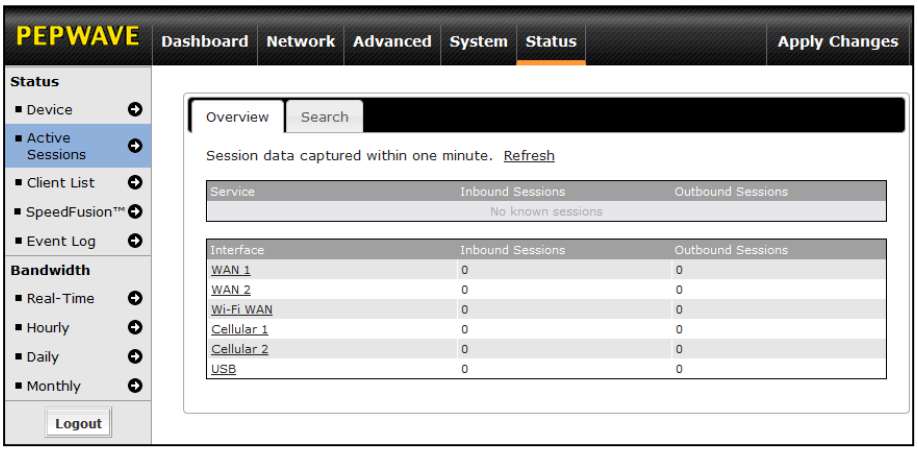
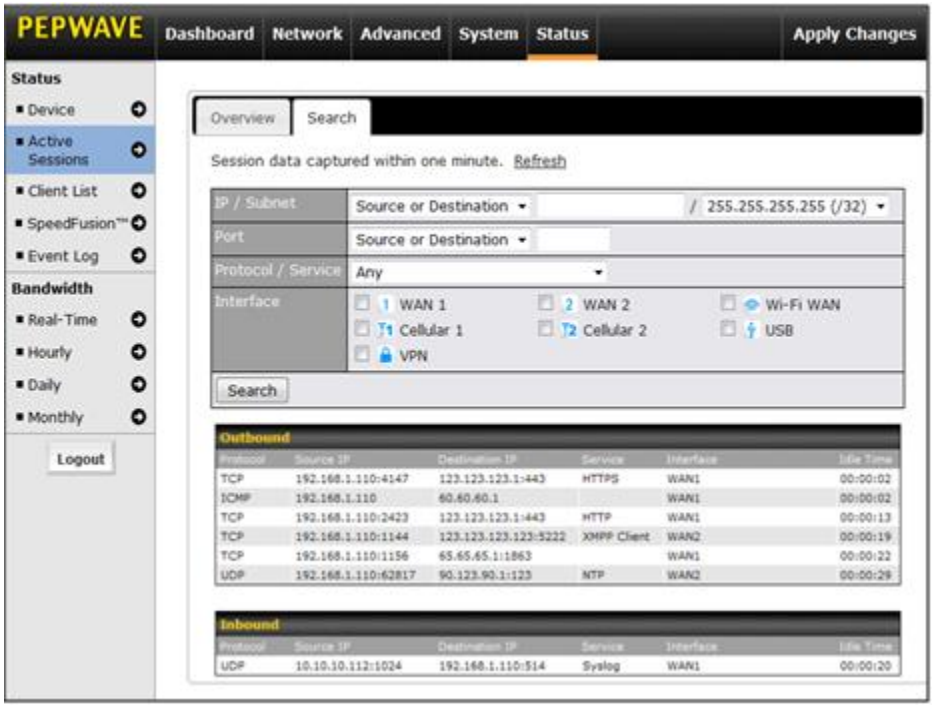
19.2 Active Sessions

Information on Active Sessions is at ***Status > Active Sessions > Overview***





This Active Sessions section displays the active inbound / outbound and UDP / TCP sessions of each WAN connection on Pepwave MAX.

A filter is available to help sort out the active session information. Enter a keyword in the field or check one of the WAN connection boxes for filtering.

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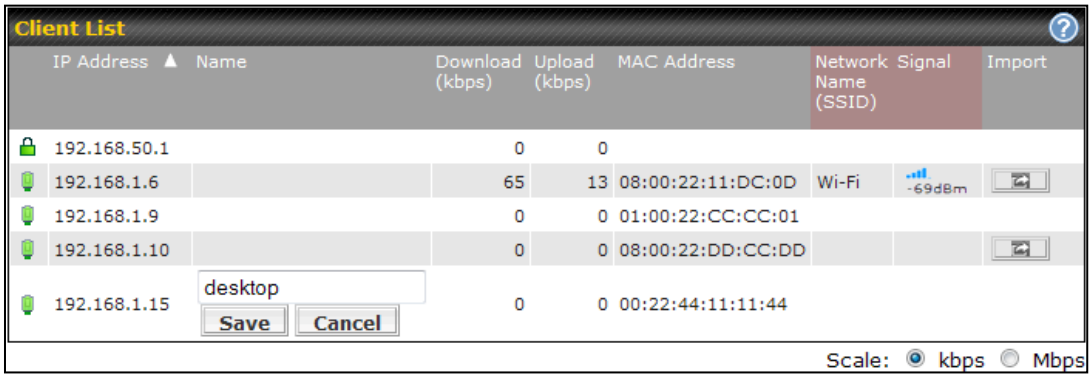
19.3 Client List

The client list table is located at ***Status > Client List***. It lists DHCP client IP addresses, their Names (retrieved from DHCP reservation table or defined by users), current **Download and Upload rate** and MAC addresses that the Pepwave MAX has offered IP addresses to since it is powered up. Network Name (SSID) and Signal refers to the information about Wi-Fi AP, which is the name of the Network and its signal strength. Clients can be imported into DHCP Reservation table by clicking the button on the right-most column. Further update the record after the import by going to ***Network > LAN***.

If PPTP Server in section 17.1 is enabled, you may see the corresponding connection name would be listed in the field of **Name**.



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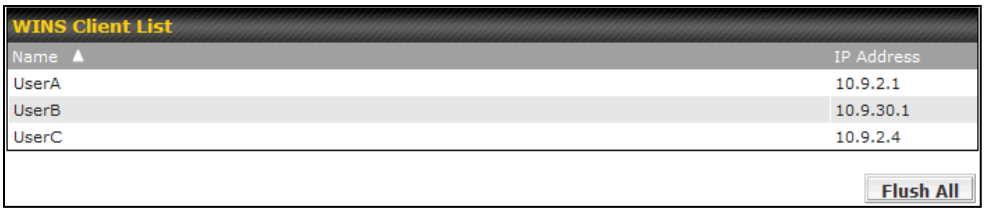
19.4 WINS Client

The WINS client list table is located at ***Status > WINS Client***. It lists WINS client IP addresses and their Names. This option will only be available when you have enabled the WINS Server in section 7.1.

Name of clients retrieved will be automatically matched into Client List in the previous section.

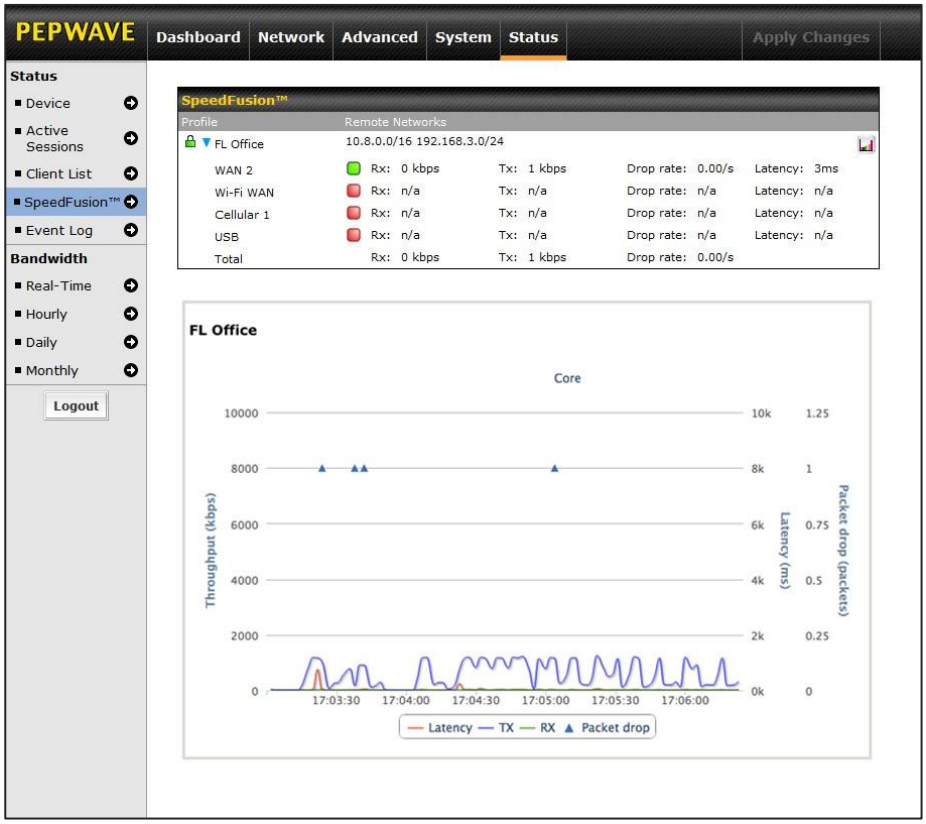
Click the button **Flush All** to flush all WINS client records.



19.5 SpeedFusion™

This is a page showing the current status of SpeedFusion™, located at: ***Status > SpeedFusion™***

Details about peer's WAN connections are listed as below.



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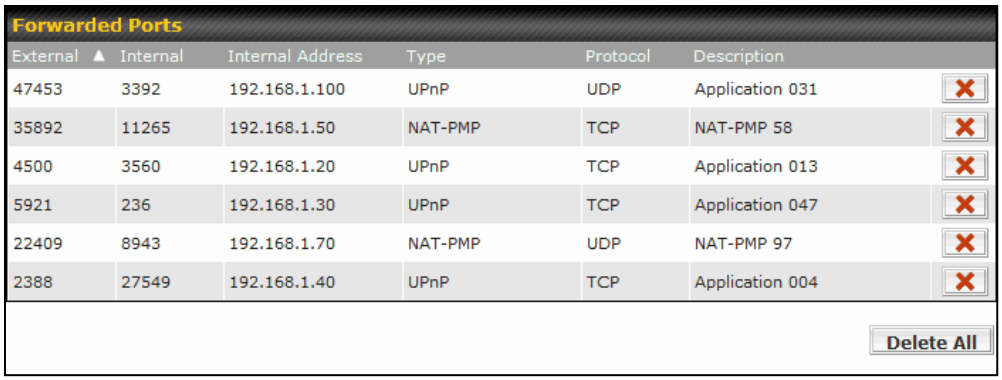
19.6 UPnP / NAT-PMP

The table that shows the forwarded ports under UPnP and NAT-PMP protocols is located at ***Status > UPnP / NAT-PMP***:

This section appears only if you have enabled the function of UPnP / NAT-PMP as mentioned in Section 13.2.



Forwarded Ports

External ▲	Internal	Internal Address	Type	Protocol	Description	
47453	3392	192.168.1.100	UPnP	UDP	Application 031	✖
35892	11265	192.168.1.50	NAT-PMP	TCP	NAT-PMP 58	✖
4500	3560	192.168.1.20	UPnP	TCP	Application 013	✖
5921	236	192.168.1.30	UPnP	TCP	Application 047	✖
22409	8943	192.168.1.70	NAT-PMP	UDP	NAT-PMP 97	✖
2388	27549	192.168.1.40	UPnP	TCP	Application 004	✖

Delete All

Click the button ✖ to delete the single UPnP / NAT-PMP record in its corresponding row. To delete all records, click **Delete All** on the right-hand side below the table.

Important Note

UPnP / NAT-PMP records would be deleted immediately after clicking the button ✖ or **Delete All** without the need to click Save or Confirm.

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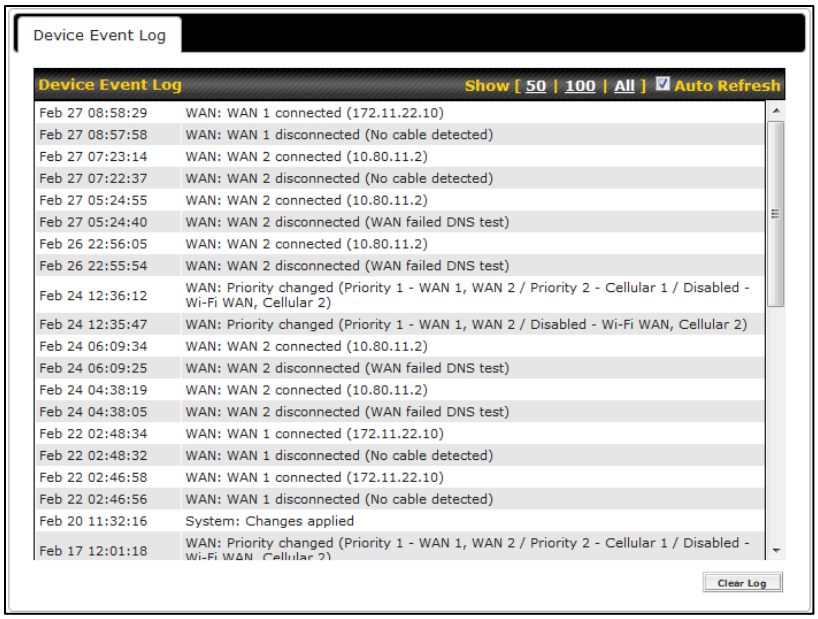
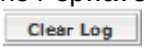
19.7 Event Log

Event Log information is located at ***Status > Event Log***:


Device Event Log
Device Event Log
Show [50 | 100 | All] Auto Refresh
Feb 27 08:58:29 WAN: WAN 1 connected (172.11.22.10)
Feb 27 08:57:58 WAN: WAN 1 disconnected (No cable detected)
Feb 27 07:23:14 WAN: WAN 2 connected (10.80.11.2)
Feb 27 07:22:37 WAN: WAN 2 disconnected (No cable detected)
Feb 27 05:24:55 WAN: WAN 2 connected (10.80.11.2)
Feb 27 05:24:40 WAN: WAN 2 disconnected (WAN failed DNS test)
Feb 26 22:56:05 WAN: WAN 2 connected (10.80.11.2)
Feb 26 22:55:54 WAN: WAN 2 disconnected (WAN failed DNS test)
Feb 24 12:36:12 WAN: Priority changed (Priority 1 - WAN 1, WAN 2 / Priority 2 - Cellular 1 / Disabled - Wi-Fi WAN, Cellular 2)
Feb 24 12:35:47 WAN: Priority changed (Priority 1 - WAN 1, WAN 2 / Disabled - Wi-Fi WAN, Cellular 2)
Feb 24 06:09:34 WAN: WAN 2 connected (10.80.11.2)
Feb 24 06:09:25 WAN: WAN 2 disconnected (WAN failed DNS test)
Feb 24 04:38:19 WAN: WAN 2 connected (10.80.11.2)
Feb 24 04:38:05 WAN: WAN 2 disconnected (WAN failed DNS test)
Feb 22 02:48:34 WAN: WAN 1 connected (172.11.22.10)
Feb 22 02:48:32 WAN: WAN 1 disconnected (No cable detected)
Feb 22 02:46:58 WAN: WAN 1 connected (172.11.22.10)
Feb 22 02:46:56 WAN: WAN 1 disconnected (No cable detected)
Feb 20 11:32:16 System: Changes applied
Feb 17 12:01:18 WAN: Priority changed (Priority 1 - WAN 1, WAN 2 / Priority 2 - Cellular 1 / Disabled - Wi-Fi WAN, Cellular 2)
Clear Log

The log section displays a list of events that has taken place on the Pepwave MAX unit. Click the Auto **Refresh** to retrieve log entries again. Click the **Clear Log** button  to clear the log. Select **50**, **100**, or **all** to show the corresponding number of events in the log.

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19.8 Bandwidth

This section shows the bandwidth usage statistics, located at: ***Status > Bandwidth***

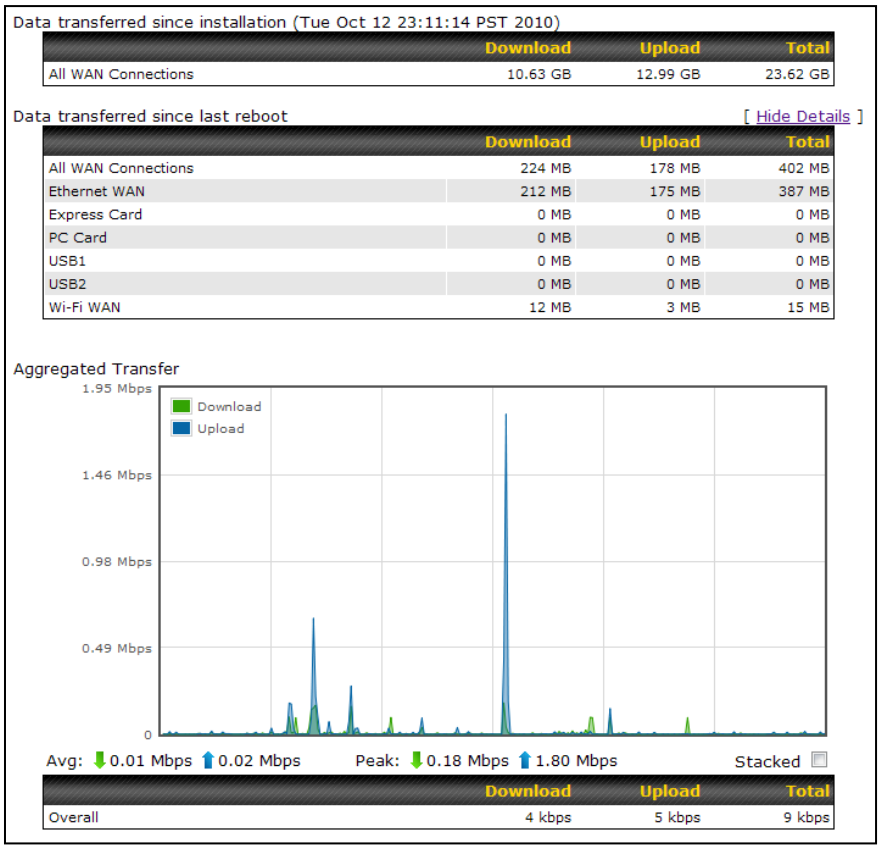
Bandwidth usage at the LAN and when the device is switched off, bandwidth usage is not recorded and not shown.

19.8.1 Real-Time

The **Data transferred since installation** shows you how many network traffic has been processed by your device since first boot.

Click **Show Details** in the top right hand corner of each table and the details of data transferred will be shown.

The check box **Stacked** below the data transferred graph can be checked to show the aggregated transferred rate of both traffic directions.


Data transferred since installation (Tue Oct 12 23:11:14 PST 2010)
Download Upload Total
All WAN Connections 10.63 GB 12.99 GB 23.62 GB
Data transferred since last reboot
[Hide Details]
Download Upload Total
All WAN Connections 224 MB 178 MB 402 MB
Ethernet WAN 212 MB 175 MB 387 MB
Express Card 0 MB 0 MB 0 MB
PC Card 0 MB 0 MB 0 MB
USB1 0 MB 0 MB 0 MB
USB2 0 MB 0 MB 0 MB
Wi-Fi WAN 12 MB 3 MB 15 MB
Aggregated Transfer
1.95 Mbps
1.46 Mbps
0.98 Mbps
0.49 Mbps
0
Download
Upload
Avg: 0.01 Mbps 0.02 Mbps
Peak: 0.18 Mbps 1.80 Mbps
Stacked
Download Upload Total
Overall 4 kbps 5 kbps 9 kbps

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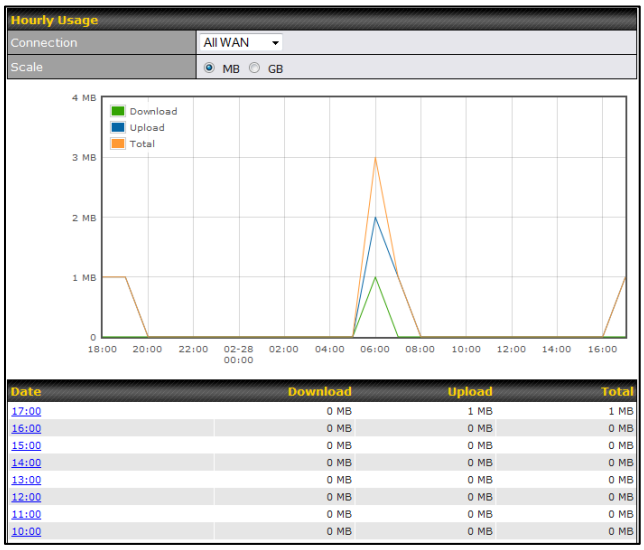
19.8.2 Hourly

This page shows the daily bandwidth usage for all and each WAN connection.

Select the connection in which you want to check its usage from the drop down menu



Date	Download	Upload	Total
17:00	0 MB	1 MB	1 MB
16:00	0 MB	0 MB	0 MB
15:00	0 MB	0 MB	0 MB
14:00	0 MB	0 MB	0 MB
13:00	0 MB	0 MB	0 MB
12:00	0 MB	0 MB	0 MB
11:00	0 MB	0 MB	0 MB
10:00	0 MB	0 MB	0 MB

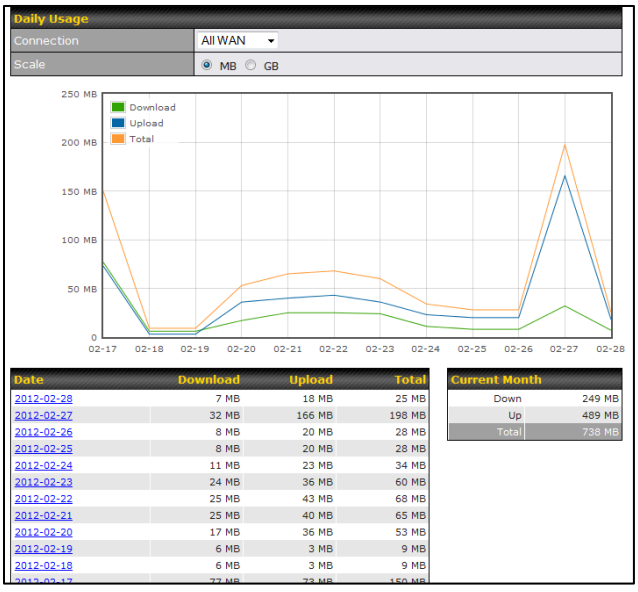
19.8.3 Daily

This page shows the daily bandwidth usage for all and each WAN connection.

Select the connection in which you want to check its usage from the drop down menu. If you have enabled **Bandwidth Monitoring** feature as shown in section 8.5, the **Current Billing Cycle** table for that WAN connection will be displayed.

Click on a date to view the client bandwidth usage of that specific date. This feature is not available if you have selected to view the bandwidth usage of only a particular WAN connection.

The Scale of the graph can be set to show in **Megabyte (MB)** or **Gigabyte (GB)**.



Date	Download	Upload	Total
2012-02-28	7 MB	18 MB	25 MB
2012-02-27	32 MB	166 MB	198 MB
2012-02-26	8 MB	20 MB	28 MB
2012-02-25	8 MB	20 MB	28 MB
2012-02-24	11 MB	23 MB	34 MB
2012-02-23	24 MB	36 MB	60 MB
2012-02-22	25 MB	43 MB	68 MB
2012-02-21	25 MB	40 MB	65 MB
2012-02-20	17 MB	36 MB	53 MB
2012-02-19	6 MB	3 MB	9 MB
2012-02-18	6 MB	3 MB	9 MB

Current Month	
Down	249 MB
Up	489 MB
Total	738 MB

All WAN Daily Bandwidth Usage

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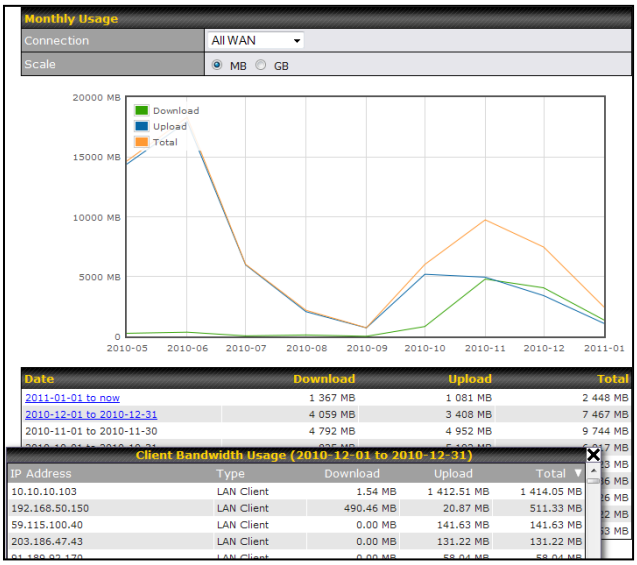
19.8.4 Monthly

This page shows the monthly bandwidth usage for each WAN connection.

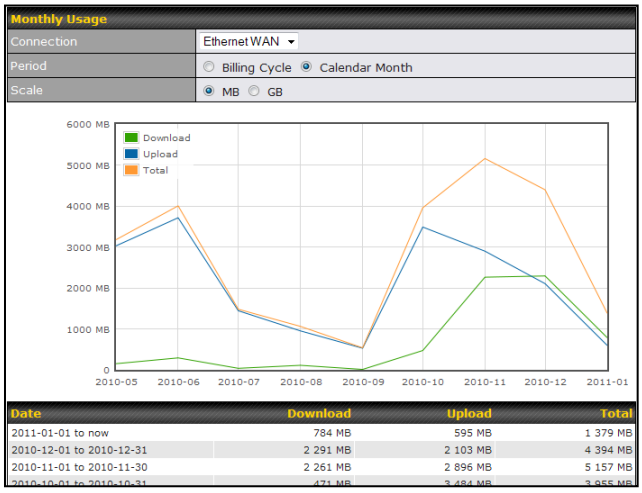
If you have enabled **Bandwidth Monitoring** feature as shown in section 8.5, you can choose a particular connection to check its usage and select to show the monthly usage period in **Billing Cycle** or **Calendar Month**.

Click the first or second row to view the client bandwidth usage of the current month. This feature is not available if you have chosen to view the bandwidth usage of only a particular WAN connection.

The Scale of the graph can be set to show in **Megabyte (MB)** or **Gigabyte (GB)**.



All WAN Monthly Bandwidth Usage



Ethernet WAN Monthly Bandwidth Usage

Tip

By default, the scale of data size is in **MB**. 1GB equals to 1024MB.

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Appendix A. Restoration of Factory Defaults

To restore the factory default settings on a Pepwave MAX unit, follow the steps below:

1. Locate the reset button on the front panel of Pepwave MAX unit.
2. With a paper clip, press the reset button and hold it for at least 10 seconds until the unit reboots itself.

After Pepwave MAX finishes rebooting, the factory default settings will be restored.

Important Note
All previous configurations and bandwidth usage data will be lost after restoring the factory default settings. Regular backup of configuration settings is strongly recommended.

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Appendix B. Declaration

1. **The device supports time division technology**

2. **Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

1) Reorient or relocate the receiving antenna.
2) Increase the separation between the equipment and receiver.
3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
4) Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 11.

IMPORTANT NOTE

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination.

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